PrintList Pro™

User Manual

Version 5.2

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About PrintList Pro

What is PrintList Pro, and what can I do with it?

PrintList Pro is an easy-to-use tool for printing arrays and records on 4th Dimension layouts. It lets you print arrays or fields.

PrintList Pro is the perfect complement to AreaList Pro, providing a full-featured plug-in, which can be used to print columns of data. You can use PrintList Pro for any standard columnar output (arrays or fields) and it be configured to easily print a PrintList Pro object, retaining all formatting features.

Because PrintList Pro is a plug-in, it is very fast, and provides capabilities not available to you using native 4D arrays or report printing tools, such as automatic column sizing, custom formatting, robust break level processing, calculated columns and more.

Data is passed to PrintList Pro using 4D arrays, or field numbers. If only two columns need to be printed, create two arrays or specify two fields and pass them as parameters to PrintList Pro. No string parsing or other contortions are needed.

PrintList Pro can be used with just one command — no special formatting is required. For those cases when more control is needed, several optional commands give you complete control over the appearance of the area.

Special tools are implemented if you wish to customize the appearance and configuration of PrintList Pro, allowing the customization to be implemented rapidly.

PrintList Pro's break level processing includes the ability to apply a variety of built-in calculations as well as the ability to perform custom calculations. Complete control over style, color, and formatting of all break level information is given.

Technical Details

Compatibility Information

PrintList Pro version 5 is compatible with 4th Dimension v11, v12, v13 and above, for both Macintosh and Windows (including 4D Server 64 bits). It requires MacOS 10.5 or higher and Windows XP SP3 or better.

Technical Support

Technical support for PrintList Pro is provided electronically via e-mail or our online support reporting system. You are encouraged to use the online web reporting form as it will be correctly routed to the appropriate support personnel.

www.e-node.net

Using the PrintList Pro Manual

This manual is organized into the following sections:

1. Introductory section: explains what PrintList Pro can do and gets you started
2. Upgrading from Previous Versions: compatibility notes and new features
3. Getting Started: installation, registration and development overview
4. Configuring PrintList Pro: how to set up a PrintList Pro area
5. Configuration Commands
6. Using the Callback Methods: a "callback" is a 4D project method which is executed by a plug-in
7. Field and Record Commands: PrintList Pro can either display arrays or fields
8. Calculated Columns: PrintList Pro columns can be calculated "on the fly" to print the results of calculations performed in a callback method, both in field and array printing modes
9. Break Level Processing: this powerful set of features makes the whole difference when using PrintList Pro compared to other printing tools
10. Examples: detailed step by step examples on how to use PrintList Pro's various features
11. PrintList Pro Constant List: a full list of PrintList Pro constants, organized by theme with each constant's actual value
12. PrintList Pro Text Style Tags: special tags can be used in any text contained in a PrintList Pro area to print styled characters
13. Index

Items that are new or modified in PrintList Pro version 5.x are displayed in pink (magenta) characters.

Cross-Referencing Format

Each time a command or section is mentioned, a cross-reference is given through hyperlinks to let you quickly find the definition for the command.

Command Descriptions and Syntax

Each PrintList Pro command (or routine) has a syntax, or rules, that describe how to use the command in your 4D database. For each command, the name of the command is followed by the command's parameters. The parameters are enclosed in parenthesis, and separated by semicolons.

Following the command syntax description, an explanation of the command's parameters is provided. For each parameter, the type of the parameter and a description is shown. Examples are provided, showing the syntax as well as how the various commands are used together.

The first parameter for most commands is the long integer reference of the PrintList Pro object on the layout. This parameter is required to allow the commands to operate on the correct object.

Some routines are actually functions, which return a long integer result value. Unless otherwise indicated, the value is 0 when no error occurred, or -50 (paramErr) when a wrong parameter has been received.

Upgrading from Previous Versions of PrintList Pro

PrintList Pro version 5 is compatible with 4th Dimension versions 11 and above.

To upgrade to PrintList Pro version 5, simply install it as described in the Installation section of this manual, replacing your older version.

Two major differences with previous versions

As opposed to v4.x (and earlier releases):

- PL_Register returns **0** if registration was successful
- The 4D project method ***Compiler_PLP*** is no longer needed

Compatibility Notes

- PrintList Pro version 5 supports Unicode for printing.
- Styled text is supported.
- PrintList Pro version 4.x commands are still here: your previous code should work fine, give or take the few changes and minor deprecated features below.
- The PL_Register command takes just one parameter, and it returns 0 for OK and an integer between 1 and 8 if not OK.
- The 4D project method ***Compiler_PLP*** is no longer needed.
- In addition, PrintList Pro uses native drawing. Not all fonts contain italic (or bold) variations and those technologies do not synthesize styles. For example Geneva on most Macs has only the Regular typeface, Arial has Regular, **Bold**, *Italic* and ***Bold Italic*** typefaces. If any styles are not present in the OS, PrintList Pro will print regular (plain) characters.
- The following features are removed:
  - ▷ picture escapes in text
  - ▷ outline
  - ▷ shadow
- The following commands are removed:
  - ▷ ***PL_GetAdvProps*** (did nothing in PrintList Pro 4.7, anyway)
  - ▷ ***PL_SetArrays*** (must use PL_SetArraysNam)
  - ▷ ***PL_SetHeaderIcon*** (use PL_SetCellIcon with **cellRow** = 0)
  - ▷ ***PL_SetSubSelect***
  - ▷ ***PL_SaveData*** (was documented as obsolete – use the new PL_Save in XML)
  - ▷ ***PL_RestoreData*** (was documented as obsolete – use the new PL_Load in XML)

New Commands

- PL_SetCellIcon now only supports pictures from the Picture Library. 'cicn' and 'PICT' resources are no longer supported.
- Escape characters ("^1234" in cell data or headers) are no longer supported, including the first parameter to PL_SetMiscOptions)
- Patterns are no longer supported. They are interpreted by PrintList Pro version 5 as transparency ratios:
  - ▷ "black": 100%
  - ▷ "darkgray": 75%
  - ▷ "gray": 50%
  - ▷ "lightgray": 25%
  - ▷ "white" or "none" or "" or anything else: 0% = no drawing

New Configuration commands

- PL_AddColumn (areaRef:L; dataPointer:Z; insertAt;L) -> result:L
  - ▷ add column at position **insertAt**; zero means append to the end
  - ▷ when in Records mode, **dataPointer** should be a pointer to a field
  - ▷ when in Arrays mode, **dataPointer** should be a pointer to an array (must not be a local array!)
  - ▷ This command supports the component architecture (using arrays from the host database in a component and vice versa)
- PL_Load (areaRef:L; XML:T) -> result:L
  - ▷ initialize an area from XML
- PL_Save (areaRef:L; XML:T) -> result:L
  - ▷ save the area settings into XML

New RGB commands

- PL_SetBrkColRGBOpt (areaRef:L; breakLevel:I; columnNum:I; showColDivider:I; lineWidth:F; dividerRed:L; dividerGreen:L; dividerBlue:L)
- PL_SetBkHColRGBOpt (areaRef:L; breakLevel:I; columnNum:I; showColDivider:I; lineWidth:F; dividerRed:L; dividerGreen:L; dividerBlue:L)
- PL_SetBrkRowRGBDiv (areaRef:L; lineWidth:F; dividerRed:L; dividerGreen:L; dividerBlue:L)

New Break Processing commands: Computed Breaks

- PL_ProcessArrays (callbackMethodName:S; breakArrays:Y; dataArrays:Y; useDetail:L) -> error:L
- PL_GetBreakValue (handle:L; column:L; calculation:L) -> value:F

See the Using Computed Breaks for details about these powerful new commands, which can be used as array utilities without need to print anything or set up a plug-in area.

Additions to existing commands

- PL_SetColOpts has a new integer parameter at the end (ignored on Mac):
  - ▷ 0 = use GDI plus for drawing (default), anything else: use GDI for drawing
  - ▷ PL_SetColOpts(areaRef:L;hideLastColumns:I;hideDetailArea:I;drawingEngine:I)
- PL_SetFormat has three new parameters at the end:
  - ▷ integer: 0 = plain text (default), anything else = attributed (multi-style) text

Note: the multi-style property is applied to all formatting in that column… breaks have to account for that!

- ▷ real: line spacing to use, 0 is substituted by 1 (default)
- ▷ integer: vertical alignment 0 - default, 1 - top, 2 - center, 3 - bottom
- ▷ PL_SetFormat (areaRef:L; columnNumber:I; format:S; columnJust:I; headerJust:I; usePictureHeight:I; attributed:I; lineSpacing:F)

- Double lines (typical in accounting) are now supported in breaks: just use 2.0 as the lineWidth (5th parameter to PL_SetBrkColOpt/PL_SetBrkColRGBOpt/PL_SetBkHColOpt/PL_SetBkHColRGBOpt). Two 0.25 point lines will be printed.

New break features

In break calculations, "\Var" will compute variance and "\Dev" will compute standard deviation

Printing an AreaList Pro area

To print AreaList Pro areas, just call ***AL_Save*** and PL_Load - they use the same XML UTF-8 format. Then set row/cell options and you are done. Or add break processing options.

Using this feature will allow you to indirectly apply AreaList Pro v9 numerous formatting options (using the v9 property-based API) to a PrintList Pro area using an AreaList Pro area as the source.

Note that this feature is only available for persistent AreaList properties. Refer to AreaList Pro manual for property persistency.

Getting Started with PrintList Pro

Installation

PrintList Pro is provided as a bundle for both Windows and Mac OS: there is just one version for both platforms. To install it, simply copy the file **PLP.bundle** into your Plugins folder.

Plugins folders can be located in one of two locations:

- In the 4D application folder (4th Dimension or 4D Server). When plugins are installed in this location, they will be available to every database that is opened with that application.
- Next to the database structure file for your project: In this case, the plugin will only be available to that database. On Mac OS, this means that the Plugins folder must be placed within the database package. To open the package, ctrl-click on the package and choose **Show Package Contents** from the contextual menu.

Registration

Using PrintList Pro in Demo mode

You can use PrintList Pro in Demo mode for 20 minutes, after which time it will cease to work. When this becomes annoying, it's time to buy a license, which you can do on our website.

Licenses are either linked to the 4D product number, the workstation or the company name as described on the License types page.

Registering your PrintList Pro Licence

Once you have purchased your licence, you will receive a registration key. This code must be registered each time the database is started.

There are three ways to register your license: in your 4D code with a command, or using the Demo mode dialog "Register" button, or though a text file.

Using PL_Register

1. Open the **On Startup** database method
2. Call the ***PL_Register*** function with your registration key - for example:

```
$result:=PL_Register("YourRegistrationKey") // result = 0 means registration was successful
```

If you have several licenses for different 4D setups you can call ***PL_Register*** multiple times in a row without further testing. See the Example with multiple calls.

The Demo mode dialog

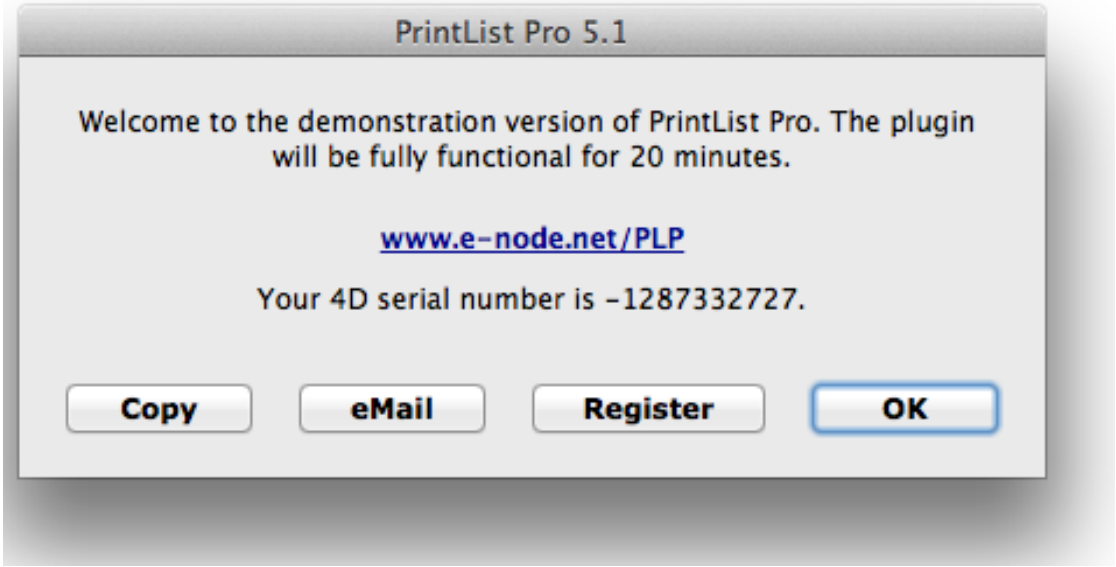
The Demo mode dialog is displayed upon first call to PrintList Pro (through a command).

Note that calling PL_Register with any key (valid or invalid) is the only call to PrintList Pro that will not display the dialog.

To trigger this display and enable your users to register without actually calling a command or setting up an area, pass an empty string to ***PL_Register*** and the dialog will show:

```
C_LONGINT ($result)
$result:=PL_Register ("") // display the dialog
```

The Demo mode dialog includes all relevant information to obtain your license, as well as a "Copy" button to put this information into your clipboard or a text file, an "eMail" button to email the information to e-Node's registration system and a "Register" button to enter your license key once received:

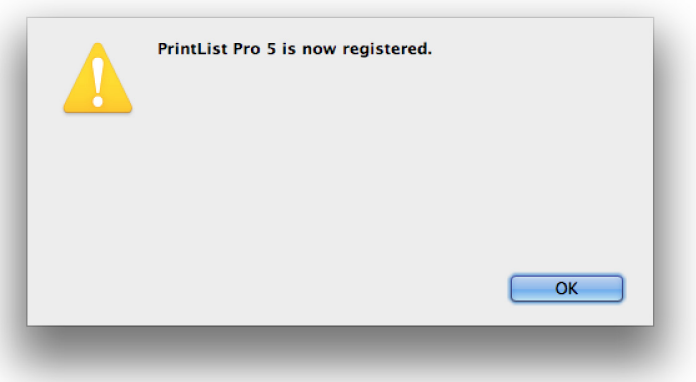


Registration

Using the “Register” button

Clicking on this button will display a standard 4D request to enter your registration key:

Paste or drag and drop your registration key and, if correct, the plug-in will be registered for all future uses on this workstation:

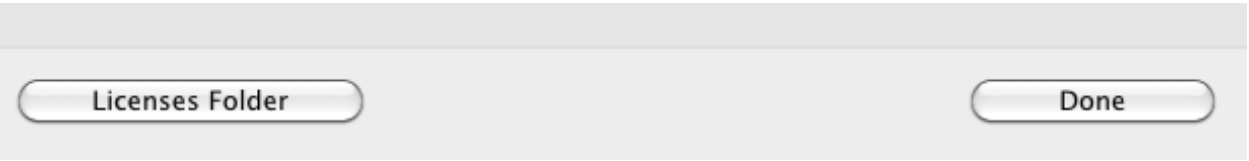


Note: if 4D does not activate the Edit > Paste menu item click Abort and Register again.

Using a text file

Alternately, you can place a plain text file into your 4D Licenses folder.

To open this folder from 4D use the 4D Menu Help > Update licenses then the Licenses folder button:



The text file must be called "PLP5.license4Dplugin" and be a plain text type file.

Just paste all your licenses for PrintList Pro v5.x, one per line, e.g.:

MyLicense1

MyLicense2

MyLicense3

Any license type can be included into this document, except unlimited single user, OEM and Partner licenses.

Note: the Demo mode dialog “Register” button actually does this: create the text file and include the license key, or add the license key to the existing document if any.

Mixing methods

When such a file exists in the Licenses folder PrintList Pro will check for valid licenses from this document as a first action before anything else (including checking any PL_Register command).

If a valid license is included into the "PLP5.license4Dplugin" document any calls to ***PL_Register*** will return zero (for "OK").

Therefore you can mix modes and use the text file (or “Register” button) as well as the command.

Unlimited single user, OEM, temporary and Partner licenses can only be entered through the ***PL_Register*** command.

Registering Server licenses

Similarly, server licenses can be registered from the demonstration mode dialog without having to modify your code and use ***PL_Register*** (which of course you can do with any license type).

In this case, the 4D Licenses folder, serial information or machine ID used will only be the 4D Server information, not the client workstation's.

Server licenses can be registered on any client workstation (remote mode), or on 4D Server itself.

Registering in Remote mode

The server and all workstations can be registered from any single client workstation connected to the server. As in Single user mode, the Demo mode dialog will be displayed on a client workstation when one of the following conditions are met:

- Calling a PrintList Pro command other that ***PL_Register*** with a non-empty parameter
- Calling ***PL_Register*** with an empty string

Use the Copy, eMail and Register buttons just as above and your server will be registered for all workstations.

Note that any other workstations previously connected (before registration occurred) will need to re-connect to the server to be functional.

Registering on 4D Server

To directly register the server and all workstations from the server machine itself, you need to display the Demo mode dialog on the server.

Call PL_Register with an empty string in the **On Server Startup** base method:

```
C_LONGINT ($result)
$result:=PL_Register ("") // display the dialog
```

Use the Copy, eMail and Register buttons just as above and your server will be registered for all workstations.

Note that the dialog will automatically be dismissed on the server after one minute in order not to block client connections (the server is only available to client workstations once the **On Server Startup** method has completed).

Merged licenses notes

Both methods can be either used with regular or merged servers and client workstations.

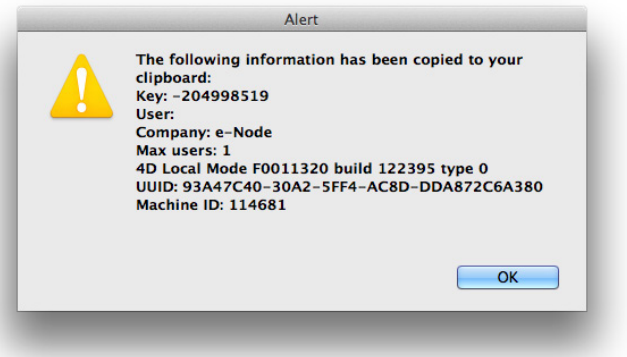
- Regular licenses are linked to the 4D Server serial information
- Merged licenses are linked to the 4D Server machine ID

Note that merged licenses will keep working if your 4D Server serial information is modified (upgrading or 4D Partner yearly updates), or if any client workstation hardware is changed.

It will only have to be updated if the 4D Server hardware is changed, or if the plugin itself requires a new key (paid upgrades upon major version changes).

You may want to register your merged server without having to turn off the database to modify the code.

This is possible using any 4D setup on the server machine (such a a standard developer single user 4D). Keeping your production server alive, open the Get Serial Info Database with 4D on the same server machine. Ignore the demonstration mode dialog (if your single user 4D is not registered for the plugin) and wait for the next Alert:



A text file is also saved with the same information. The last line "Machine ID" is the number that you need to send in order to receive your merged server registration key.

For current pricing, please see the ordering page on our website.

Registration

License types

Like all e-Node plug-ins, PrintList Pro offers several license types. There are no such things as MacOS vs Windows or Development vs Deployment:

- **Single-user license.** This license allows development (interpreted mode) or deployment (interpreted or compiled mode, except merged) on 4D Standalone or 4D SQL Desktop. Since the registration key is linked to a specific 4D license, you need to provide the number returned by the "Copy" or "eMail" buttons from the plugin demonstration mode alert (this number is actually the 4D command **GET SERIAL INFORMATION** first parameter). A new license will be supplied for free at any time if you change your 4D version and/or get a new 4D registration key, provided that your previous licenses match the current public version at the exchange time. Note that if you are using several concurrent versions of 4D you will need one plugin license for each version.

- **Server licenses.** These licenses allow development (interpreted mode) or deployment (interpreted or compiled mode, except merged servers) on 4D Server with up to 10 users ("small server"), 11 to 20 users ("medium server") or more ("large server"). The registration key is linked to your 4D Server license just as above.

- **Merged licenses.** These licenses are designed for single user compiled/merged applications built with 4D Volume Desktop (one license per workstation) or for merged server and related client applications (one license per server). They are linked to the machine ID (server or single user workstation), not the 4D serial number.

- **Unlimited Single User.** This license allows development (interpreted mode) or deployment (interpreted or compiled mode, including merged) on any number of single user 4D application(s). This is a yearly license, which expires after the date when it is to be renewed. The expiration only affects interpreted mode. Compiled applications using an obsolete license will never expire.

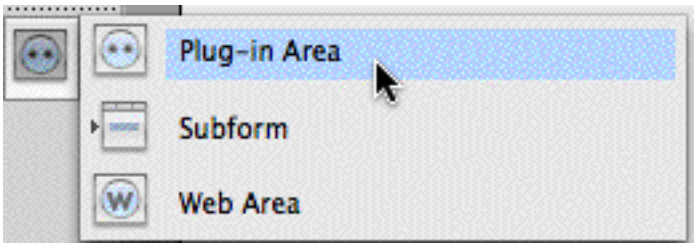
- **Unlimited OEM.** This license allows development (interpreted mode) or deployment (interpreted or compiled mode, including merged) on any number of 4D Servers (any number of users), 4D Standalone, 4D SQL Desktop or merged copies that run your 4D application(s). This is a yearly license, which expires after the date when it is to be renewed. The expiration only affects interpreted mode. Compiled applications using an obsolete license will never expire.

- **Partner license.** This license matches 4D's annual Partner subscription and covers AreaList Pro, SuperReport Pro, PrintList Pro and CalendarSet. A single registration key allows development (interpreted mode) or deployment (interpreted or compiled mode, except merged) on all 4D Standalones and 4D Servers (2 users) provided by your 4D Partner license. No merged applications. This is a yearly license, which expires on February 1st (same date as your 4D Partner licenses). The expiration only affects interpreted mode. Compiled applications using an obsolete license will never expire.

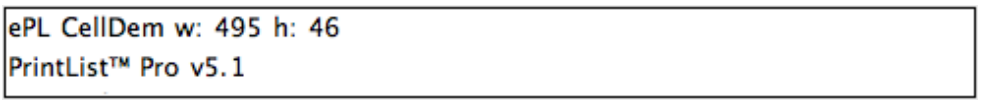
Creating your first PrintList Pro Area

It's easy to create your first PrintList Pro list area.

1. Create a new form, or open an existing one that you want to add a list to.
2. Choose **Plug-in Area** from the Plugin/Subform/Web Area button in the object bar:



3. Your cursor will turn into a crosshair. Draw a box on the form in the size that you want your list to be. This will create a rectangular box named **Plugin Area**.
4. In the Property List window, choose **PrntListPro** from the **Type** popup menu. (If the PrintListPro option is not available, please refer to the installation instructions).
5. Enter a name for your new area in the Variable Name field in the Property List window.
6. Your area will now show the PrintListPro version, area variable name and dimensions:



Developing with PrintList Pro

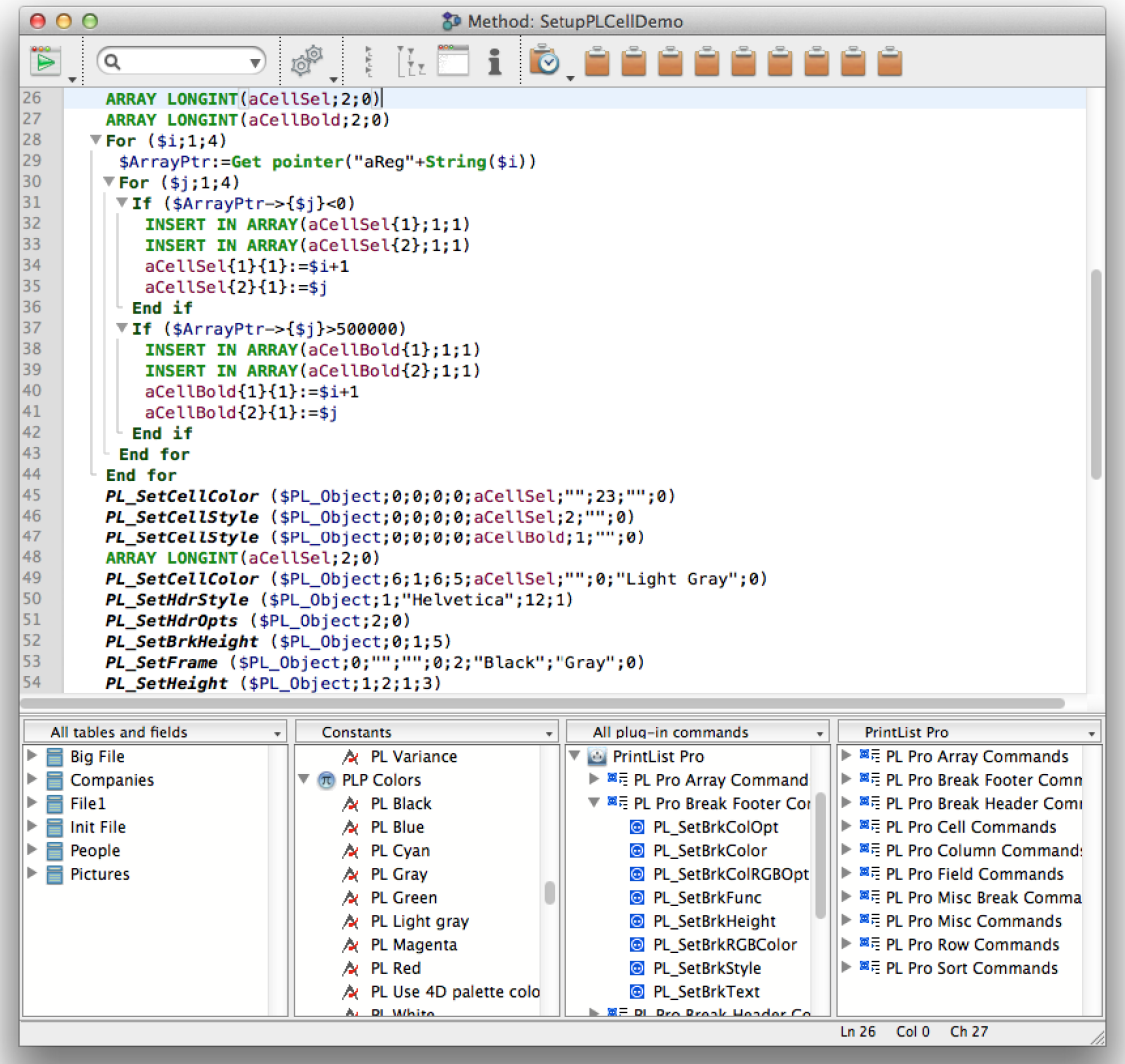
PrintList Pro provides the ability to print up to 32767 columns (subject to memory limitations).

Using the PrintList Pro Commands

The PrintList Pro Commands are used in the same way that a 4D command is used. Parameters are separated by the semicolon character (“;”).

Note: when calling a plugin command, all omitted parameters are initialized to the NULL of the respective types (0, 0.0, "", !00:00:00!, …).

You can access the PrintList Pro commands in the method editor list. Near the bottom of the list, below the area which contains the project methods, there are several PrintList Pro constant and command topics as shown below.



Simply select a constant or command, and 4D will enter it for you at the current cursor position.

You can also type the constant or command name directly into the method, or use the Explorer's Component page.

PrintList Pro commands are used to initialize the PrintList Pro object in the On Printing Detail phase of the 4D layout about to be printed. Typically, initialization code will be contained in the PrintList Pro area object method.

When to use the PrintList Pro Commands

The PrintList Pro commands must only be executed in the On Printing Detail phase of a form method or object method during the execution of the **PRINT SELECTION** or **PRINT RECORD** command.

The **PRINT SELECTION** command will execute a On Printing Detail phase for each record in the current selection (and requires at least one record in the current selection to be executed at all). PrintList Pro will print the array(s) in any PrintList Pro object once for every record in the current selection.

If you wish to use **PRINT SELECTION** to print an array only once, ensure that there is only one record in the current selection of the table used for printing (the one that holds the layout, which doesn't have to be related to the data that is actually printed).

If you wish to use **PRINT RECORD**, ensure that there a current record in the table used for printing (the one that holds the layout, which doesn't have to be related to the data that is actually printed).

Configuring PrintList Pro

A PrintList Pro object is initialized in the On Printing Detail phase as the record is about to be printed.

This initialization will be contained in the PrintList Pro plug-in area object method or in the form method.

Using Defined Constants with PrintList Pro

There are defined constants that may be used as values for many parameters in the PrintList Pro commands. See the Constants tab of the Explorer in the 4D Design environment.

These constants are categorized according to the type of command that they are associated with, such as PLP Break Levels, PLP Colors, etc.

Specifying the Arrays to Print

4D arrays are passed to PrintList Pro via the PL_SetArraysNam command.

PL_SetArraysNam must be called before any other PrintList Pro commands are executed.

This is necessary to provide PrintList Pro with an opportunity to allocate the data structures necessary to store formatting information for each column. These data structures are allocated on a per column basis, and ***PL_SetArraysNam*** for a given column must be executed before any property of that column can be specified.

If the ***PL_SetArraysNam*** command is incorrectly used, an error code indicating the problem will be returned:

Constant	*Value*	*Action*
PL SetArrays Passed	0	
PL Not an array	1	Check to make sure all arrays are correctly typed
PL Wrong type of array	2	Pointer and two-dimensional arrays are not allowed
PL Wrong number of rows	3	Make sure that all arrays have the same number of elements
PL Maximum number of arrays exc	4	32767 arrays is the maximum
PL Not enough memory	5	Unlikely these days

Up to 32767 arrays can be printed by PrintList Pro, with up to fifteen columns specified in each call to ***PL_SetArraysNam***.

The position of the first array, **columnNumber**, and the number of arrays, **numArrays**, are also specified in this command. All array types except for pointer are allowed, and all arrays must have the same number of elements.

Specifying the Arrays to Print

The maximum number of rows is only limited by available memory.

Aternately to standard single-dimension arrays, one dimension of a two-dimensional array may be passed to PL_SetArraysNam e.g. "My2DArray{1}" may be passed as **array1**.

In addition, PL_AddColumn can be used to add or insert and array or field column through a pointer.

Printing Records

PrintList Pro provides the capability to print 4D records directly, rather than using arrays. Please read the section Field and Record Commands for more information.

Headers

The column header labels are set using PL_SetHeaders. The headers can be printed on all pages, the first page or not at all using PL_SetHdrOpts.

The font, size, and style of each header may be set individually using PL_SetHdrStyle.

The justification may be set using PL_SetFormat and the color of the headers using PL_SetForeClr or PL_SetForeRGBColor.

Multiple lines of text may be shown in the headers using PL_SetHeight.

Sorting Arrays

PrintList Pro can perform multi-level sorting upon all the arrays using PL_SetSort.

Up to 15 levels of sorting are available, and each column specified in the sort order can be sorted in either ascending or descending order.

While 15 columns can be used for the sorting critera, all the arrays passed to PrintList will stay "in sync" and reflect the new sort order.

Some of the arrays can be hidden from printing using PL_SetColOpts, which allows all the arrays to be kept in sync for sorting purposes, yet hides them during actual printing.

If the arrays passed to PrintList Pro are already sorted, use PL_SetBrkOrder to communicate the sort order to PrintList Pro without performing another sort.

Also, repeated values in a list can be suppressed using PL_SetRepeatVal. Please read the section Break Level Processing for more information.

If a column containing a picture array is passed to ***PL_SetSort***, it will be ignored (skipped).

Formatting

Use PL_SetFormat to control the format and justification of all array information.

All valid 4D formats may be used including any custom formats created in the Design Environment.

If you are calling PrintList Pro from a component, make sure that the Design formats that you are using are defined in the component itself.

See Break Level Processing for information about formatting break headers and break footers.

Styles

Column and Header Styles

Styles for arrays can be set on a column by column basis using PL_SetStyle to set the style for the data, and PL_SetHdrStyle to set the header style.

If a 0 (zero) is used in the **columnNumber** parameter, the style will be applied to all columns.

Row-Specific Styles

PL_SetRowStyle is used to set the font and style of a specified row, and will override any column specification.

Do not use row specific commands to modify all rows if you want to set the whole area. Set the columns instead.

Cell-Specific Styles

Individual array elements, called cells, can be assigned a unique font, size and style.

This capability can be used to provide special formatting to design more attractive and useful reports.

You can use PL_SetCellStyle to set the font, size and style configuration for an individual cell, a range of cells, or a selection of discontiguous cells. You can choose to set all or just one of the style attributes of this command.

PrintList Pro will keep the cell and row-specific style settings with a row when the list is sorted.

If you do not want the cell and row style settings to move when the list is sorted, you should use the cell and row style routines after the call to PL_SetSort.

Color

When using color or grayscale printers, many PrintList objects can be given color settings. Be sure to set the printer Color/Grayscale option to obtain the proper results.

Column and Header Colors

Foreground and background colors can be specified for a PrintList Pro object using PL_SetForeClr and PL_SetBackClr.

The foreground color can be specified for each column and column header, and the background color can be specified for the list and header areas.

In addition, PL_SetForeRGBColor and PL_SetBackRGBColor can be used to perform similar settings with standard RGB values.

Row-Specific Colors

PL_SetRowColor is used to set the foreground and background color of a specified row, and will override any column specification.

You can revert to the original column settings by setting the **plpRowForeColor** or **plpRowBackColor** parameter to the empty string (""), and the **4dRowForeColor** or **4dRowBackColor** parameter to -1.

PL_SetRowRGBColor can be used to perform similar settings with standard RGB values.

Use this command to override all row-specific color settings by passing 0 for the **rowNumber** parameter.

Do not use row specific commands to modify all rows if you want to set the whole area. Set the columns instead.

Cell-Specific Colors

Individual array elements, called cells, can be assigned a unique foreground color and background color.

This capability can be used to set negative numbers in red, provide special formatting to show the current selected or enterable cell, and design more attractive and useful lists.

You can use PL_SetCellColor or PL_SetCellRGBColor to set the color configuration for an individual cell, a range of cells, or a selection of discontiguous cells.

PrintList Pro will keep the cell and row-specific color setting with a row when the list is sorted.

If you do not want the cell and row color settings to move when the list is sorted, be sure to call the cell and row color routines after the call to PL_SetSort.

Multiple Lines in each Row

Multiple lines of text can be shown for each row using PL_SetHeight. All rows will be printed with the number of lines specified, or with a variable height for each row.

PL_SetHeight can also be used to give each row additional space above and below the row's contents to give more spread out rows vertically.

Variable Height Rows

All rows can be printed with a varying height depending on the data that is to be printed. For rows, PrintList Pro will examine each row's text, string, and picture element using the applied font and style settings to determine the tallest cell of each row.

Any given row can be of no height (i.e. no data) up to the height of an entire page. For any row that is larger than a page, PrintList Pro will attempt to show as much of it as possible by starting the row at the top of the page. The row will be truncated to a page — no one row can span two pages.

To set all rows to be variable height, use ***PL_SetHeight*** and set the **numRowLines** parameter to zero.

Setting an individual row or cell font size may cause PrintList Pro to override a fixed height row setting and print the row using a larger height.

In order to accommodate the larger font, PrintList Pro uses the variable height calculation to determine the height of the row based upon the font size setting.

When variable row height is used, Picture columns are used for row height calculation, too (even when **usePictHeight** in PL_SetFormat was set to zero).

Column Widths

Columns are automatically sized by default; however, a column size can be programmed using PL_SetWidths. All widths are given in pixels.

Dividing Lines, Frame and Header Separator Lines

Dividing lines can be added between rows and columns using PL_SetDividers or PL_SetRGBDividers. The line width, pattern (transparency ratio), and color of the lines can be specified. The default is no dividing lines.

The PrintList Pro frame and header separator (the line between the headers and the list or detail area) lines can be set using PL_SetFrame.

You (or the database end-user) must be sure to set the Color/Grayscale option in the print dialog when using colors.

Hairline Line Width

Lines can be printed a fraction of the line width seen on screen (1 pixel).

Typically, ¼ (.25) pixel produces the best results. All the lines that PrintList Pro prints may be given a fractional line width.

Double lines

Double lines (typical in accounting) are now supported in breaks: just use 2.0 as the **lineWidth** (5th parameter to PL_SetBrkColOpt/PL_SetBrkColRGBOpt/PL_SetBkHColOpt/SetBkHColRGBOpt). Two 0.25 point lines will be printed.

Using Picture Arrays

PrintList Pro supports the printing of picture arrays. The **format** parameter of PL_SetFormat will cause the picture to be printed in one of five ways:

- truncated and justified to the upper left of the cell
- truncated and centered in the cell
- scaled to fit the cell
- scaled proportionally to fit the cell
- scaled proportionally to fit the cell and centered

The **usePictHeight** parameter of ***PL_SetFormat*** will tell PrintList Pro whether to use a picture's original height, which is stored with the picture, when calculating the row height for the PrintList Pro area.

If you choose not to use the picture's height in the row height calculation and additional space is needed to print the picture, the **numRowLines** parameter of PL_SetHeight should be used to increase the row height.

End of Page Callback Method

In 4th Dimension, a "callback" method is a project method called from an plug-in. PrintList Pro makes use of a callback method to inform you when the end of a printed page is reached.

This enables you to perform any necessary processing associated with the end of the page, for example, changing information printed in the footer area of that page or the header area of the next page.

Use PL_SetPageProc to specify the 4D method PrintList Pro is to call. PrintList Pro will pass the method specified by **callbackMethod** two parameters: the first indicates which PrintList Pro area is calling the method, and the second specifies the last row printed on that page.

Performance Issues with Formatting Commands

PrintList Pro uses an algorithm to automatically size the columns. Because of this, there is usually no need to use PL_SetWidths to manually size a column prior to printing a list.

However, if the number of items in the list is very large (several thousand items with many columns), then the list might take a few seconds longer to generate, due to the automatic sizing calculation.

If this is the case, using ***PL_SetWidths*** will improve the generation time of the list. Text and string arrays will take the longest to automatically size.

Since you can use ***PL_SetWidths*** on just some of the columns, if you are printing very large arrays, but only one is text or string, you could use ***PL_SetWidths*** on just the text or string array, and let PrintList Pro automatically calculate the other column widths.

PL_SetFormat does not affect the performance of PrintList Pro, regardless of the size of the arrays being printed.

Borders and Frames

PL_SetCellBorder provides the ability to set the border style for a cell.

PL_SetCellFrame prints a frame around a range of cells.

Both commands use RGB colors.

Header / Cell Icon Support

Picture Objects in Cells

PL_SetCellIcon uses 4D Picture Library items to place icons into individual cells.

This routine includes an **iconRef** parameter, which is the reference number of a picture from the Design environment Picture Library. Pass zero (0) if you do not want any icon for the cell.

Picture Objects in Headers

In addition, ***PL_SetCellIcon*** provides the ability to procedurally place icons in column headers using 4D Picture Library objects.

Pass zero (0) in the **cellRow** parameter to set the header.

Configuration Commands

PL_Register (registrationCode:T; forceCheck:L) -> result:L

Parameter	*Type*	*Description*
→ registrationCode	text	Pass the registration key to register your copy of PrintList Pro. Only one registration key is required. The key is either linked to the 4D or 4D Server serial number (individual licenses), or to the machine ID (merged licenses), or to the name of the company/developer (unlimited annual licenses).
→ forceCheck	longint	Check the license and return a nonzero error result in case it is invalid, even if registration was successful from a previous call.
← result	longint	

Result code	*Description*
0	OK
1	Beta license has expired
2	Invalid license
3	The license has expired
4	The OEM license has expired
5	The maximum number of users has been exceeded
6	The license is for a different environment (e.g. the licence is for a single-user version, but you are using it with 4D Server)
7	The license is linked to a different 4D license
8	Invalid merged license

PL_Register is used to register the PrintList Pro plug-in for standalone or server use.

registrationCode — You must call ***PL_Register*** with a valid registration key, otherwise PrintList Pro will operate in demonstration mode - it will cease to function after 20 minutes.

forceCheck — Optional. If this parameter value is nonzero, **registrationCode** is tested regardless of current registration state. If the plugin was not previously registered and the **result** is 0, it is registered the same way as if **forceCheck** was zero (or omitted). If the plugin was previously successfully registered, a registration error will be returned in **result** in case **registrationCode** is invalid, but the plugin will remain registered.

Multiple calls to ***PL_Register*** are allowed. The plug-in will be activated if at least one valid key is used, and all subsequent calls to ***PL_Register*** will return 0, unless **forceCheck** is set to 1.

Example

```
C_LONGINT ($result)
$result:=PL_Register ("YourRegistrationKey")
Case of
      :($result=2)
         ALERT ("The PrintList Pro licence is invalid.")
      :($result=3)
         ALERT ("The PrintList Pro licence has expired.")
   // etc.
End case
```

Alternately to ***PL_Register***, you can place a plain text file into your 4D Licenses folder or use the Demo mode dialog "Register" button. This is only valid for non-unlimited licenses.

Please see the Licence Types section for detailed information about the licencing options available for PrintList Pro.

Example with multiple calls

```
C_LONGINT ($result) // ignored in this case
$result:=PL_Register ("Registration key one")
$result:=PL_Register ("Registration key two")
$result:=PL_Register ("Registration key three")
   etc.

If ($result#0) // registration failed
   ALERT ("PrintList Pro could not be registered.")
End If
```

When ***PL_Register*** is called with an empty string, the license dialog will be displayed if PrintList Pro is not registered and the dialog was not yet displayed.

This allows you to show the registration dialog to your users without effectively calling a PrintList Pro command or displaying a PrintList Pro area.

%PrintListPro

%PrintListPro is the command used to identify the PrintList Pro plug-in area when you create a plug-in area object on a layout.

This command is only used in the object definition for a PrintList Pro object, and should never be used as a command in a method.

PL_AddColumn

PL_AddColumn (areaRef:L; dataPointer:Z; insertAt;L) -> result:L

Parameter	*Type*	*Description*
→ areaRef	longint	PrintList Pro area reference
→ dataPointer	pointer	Pointer to an array or a field
→ insertAt	longint	Position where to insert the column
← result	longint	0 if successful

PL_AddColumn adds a column at the specified position.

areaRef — PrintList Pro area reference.

dataPointer — This parameter specifies the data to print in the inserted column.

- when in Records mode, this parameter must be a pointer to a field
- when in Arrays mode, this parameter must be a pointer to an array (not a local array!)

insertAt — Position where to insert the column. Zero means "append to the end".

This command supports the component architecture (using arrays from the host database in a component and vice versa).

This command can be used as an alternative to ***PL_AddColumn***, but requires one line per array. See the Calculated columns Array mode example.

Examples

```
$error:= PL_AddColumn(eList;->aState;0) // add a column containing aState array at the end
$error:= PL_AddColumn(eList;->aCity;1) // insert a column containing aCity array at position 1
```

PL_SetArraysNam

PL_SetArraysNam (areaRef:L; columnNumber:I; numArrays:I; array1:S; …; arrayN:S) -> result:L

Parameter	*Type*	*Description*
→ areaRef	longint	PrintList Pro area reference
→ columnNumber	longint	Column at which to set the first array
→ numArrays	longint	Number of arrays to set (up to 15)
→ array1; …; arrayN	string	Names of 4D arrays
← result	longint	

Constant	*Value*	*Action*
PL SetArrays Passed	0	
PL Not an array	1	Check to make sure all arrays are correctly typed
PL Wrong type of array	2	Pointer and two-dimensional arrays are not allowed
PL Wrong number of rows	3	Make sure that all arrays have the same number of elements
PL Maximum number of arrays exc	4	32767 arrays is the maximum
PL Not enough memory	5	Unlikely these days

PL_SetArraysNam tells PrintList Pro what arrays to print. Up to fifteen arrays can be set at a time. Any 4D array type can be used except pointer and two-dimensional arrays.

Since PrintList Pro can print up to 32767 arrays, this command may have to be used more than once.

There are three very important points to note about this command:

- This command must be called first, before any of the other commands, in the On Printing Detail phase.
- The columns must be added in sequential order, unless the particular column has already been added. In other words, to set 30 arrays, you must set arrays 1 through 15 prior to setting arrays 16 through 30.
- All arrays set with this command must have the same number of elements as each other and as any other arrays previously set.

You can pass process arrays and interprocess arrays to PrintList Pro, but not local arrays (a local array has a name that starts with a "$" character; an interprocess array has a name that starts with a "<>" characters).

One dimension of a two-dimensional array may be passed in the array1; …; arrayN parameters. For example: "my2DArray{1}" may be passed as array1.

areaRef — PrintList Pro area reference.

columnNumber — This parameter specifies the column number to set the first array being passed by this call of ***PL_SetArraysNam***.

numArrays — This parameter specifies the number of columns being set with this call to ***PL_SetArraysNam***.

Examples

```
Case of
   :(Form event=On Printing Detail)
      SELECTION TO ARRAY([Contacts]FN;aFN;[Contacts]LN;aLN;[Contacts]City;aCity;
                         [Contacts]State;aState) // load the arrays
      $error:=PL_SetArraysNam(eNameList;1;4;"aFN";"aLN";"aCity";"aState") // starting at column 1,
         set 4 arrays to print through the plug-in area eNameList
End case

 // Set up the eList PrintList Pro object with 25 arrays
 // two calls must be made since only 15 arrays can be passed each time
$error:=PL_SetArraysNam(eList;1;15;"array1";"array2";"array3";"array4";"array5";
   "array6";"array7";"array8";"array9";"array10";"array11";"array12";"array13";"array14";"array15")
$error:=PL_SetArraysNam(eList;16;10;"array16";"array17";"array18";"array19";"array20";
   "array21";"array22";"array23";"array24";"array25")
```

PL_SetHeaders (areaRef:L; columnNumber:I; numHeaders:I; header1:S; …; headerN:S)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ columnNumber	integer	Column at which to set up the first header
→ numHeader	integer	Number of headers to set (up to 15)
→ header1; …; headerN	string	Values to print in column headers

PL_SetHeaders is used to specify the value to print in the header for each column. Up to fifteen headers can be set at a time.

The size of the header value is used by the automatic column sizing algorithm. If you are printing a fixed-string array with an element size of 2 characters, the column will be very narrow, unless you specify a header which contains several characters.

For example, states are usually stored in a database as a two-character alpha, and you would probably print them directly or load them into a string array sized for two-characters length. But if you specify a header of "State" the column will be sized about two and a half times wider.

If the header length is less than the values being printed in the column, then the header length will not affect the column width.

A, B, C, etc. will be printed in the headers if ***PL_SetHeaders*** is not used.

Examples

```
$error:=PL_SetArraysNam(eNameList;1;4;"aFN";"aLN";"aCity";"aState")
PL_SetHeaders(eNameList;1;4;"First Name";"Last Name";"City";"State")
$error:=PL_SetArraysNam(eNames;1;2;"aFN";"aLN")
PL_SetHeaders(eNames;1;2;Field name([People]FirstName);Field name([People]LastName))
```

PL_SetFormat (areaRef:L; columnNumber:I; format:S; columnJust:I; headerJust:I; usePictureHeight:I; attributed:I; lineSpacing:F; vertAlignment:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ columnNumber	integer	Column at which to set the format and justification
→ format	string	Format to use
→ columnJust	integer	Justification for column list items
→ headerJust	integer	Justification for column header
→ usePictHeight	integer	Use the picture height in the row height calculation
→ attributed	integer	Use attributed (multi-style) text: 0 = no, 1 = yes
→ lineSpacing	real	Line spacing to use
→ vertAlignment	integer	Vertical alignment: 0 = default, 1 = top, 2 = center, 3 = bottom

PL_SetFormat is used to control the format and justification of a column being printed. You can control the format of string, integer, long integer, real, date, boolean, and picture columns with the **format** parameter. Time values can be formatted also, since they use long integer arrays.

Any valid 4D format, including custom formats created in the Design environment, may be used with these column types.

Text columns can only be formatted using styled text with the **attributed** parameter set to 1.

Additionally, null time and date values can be set to print a blank by appending a dash character (“-”) to the format string parameter.

The defaults for the different column types are:

Column Type	*Format*
Integer	"##,##0"
Long Integer	"#,###,##0"
Real	"#,###,##0.00"
Boolean	"True;False"
Date	"0"
Picture	"0"

format (for string arrays) — Any formatting characters supported for 4D are allowed. Pre-defined styles (i.e. those saved in the Design environment) are not allowed.

format (for text arrays) — Not supported, except for attributed text according to the value set by the **attributed** parameter.

format (for numeric arrays) — See the 4D command **String** in the 4D Language Reference for the possible values. Any valid 4D numeric format may be used.

format (for boolean arrays) — The string contains two formats, one for the **True** value, the other for the **False** value, separated by a semicolon. Examples: "Male;Female" and "MacOS;Windows".

format (for date arrays) — See the 4D command **String** in the 4D Language Reference for the possible values. Any valid 4D date format may be used. Examples: "0" or "3" are valid formats.

Format	*Example*
0	09/20/07 (default)
1	9/20/07
2	Thu, Sep 20, 2007
3	Thursday, September 20, 2007
4	09/20/07 or 09/20/1997
5	September 20, 2007
6	Sep 20, 2007

format (for "time" arrays) — See the 4D **String** command in the 4D Language Reference, and the 4D Design Reference discussion of formatting for the possible values. There are no time arrays in 4D as such, they are in reality long integer arrays. These arrays are printed as time ***PL_SetFormat*** values by using the proper format. The format is the two character sequence "&/" followed by the number given in the discussion of the **String** command. For example, one proper format for a time array would be "&/2".

Format	*Example*
0	01:02:03
1	01:02
2	1 hour 2 minutes 3 seconds
3	1 hour 2 minutes
4	1:02 AM

format (for picture arrays):

- 0 — the picture will be truncated, if necessary, and justified to the upper left (default)
- 1 — the picture will be truncated, if necessary, and centered in the cell
- 2 — the picture will be scaled to fit the cell
- 3 — the picture will be scaled to fit the cell, and remain proportional to its original size
- 4 — the picture will be scaled to fit the cell, remain proportional to its original size, and centered in the cell

In addition:

- If **format** is not specified or out of range, the value will be interpreted as 0
- Formats 1 and 4 are always centered, format 2 fills the whole rectangle
- Only formats 0 and 3 will use the specified **columnJust** (default alignment is centered for these two formats)

columnJust and **headerJust** — The justification for a column and its header can be controlled independently. The possible values are:

Value	*Justification*
0	Default
1	Left
2	Center
3	Right

By default, headers are left justified, unless the column elements are center justified. In that case, the header will default to center justification.

The default column justifications for the different column types are:

Column Type	*Default Column Justification*
Integer	right
Long Integer (including Time)	right
Real	right
Boolean	left
Date	right
String	left
Text	left
Picture	depending on the **format** parameter

The **columnJust** parameter is only used for picture columns where the **format** parameter is set to 0 or 3 (or not specified or out of range). Other values will use the **format** parameter to justify picture columns.

usePictHeight:

- 0 — ignore the picture height when calculating the row height (default)
- 1 — use height of the largest picture when calculating the row height

If the column **columnNumber** does not have a picture column, this parameter will be ignored.

If the list is configured to automatically calculate variable height rows, then picture array elements are always included in the automatic calculation, and this parameter is ignored. See ***PL_SetHeight*** and Variable Height Rows for more information.

attributed:

PrintList Pro supports the multi-styled text feature of 4D v12 and above. When 4D passes multi-styled text to PrintList Pro, it should be printed correctly if this option has been set.

If this option is set, special tags can also be used in any text contained in a PrintList Pro area to display styled characters. See PrintList Pro Text Style Tags.

- 0 — plain text (default)
- 1 (or any non-zero value) — attributed (multi-style) text

Note: the multi-style property is applied to all formatting in that column -> breaks have to account for that!

lineSpacing:

Line spacing to use (real value). 0 is substituted by 1.0 (default), which is also the default line spacing value used by AreaList Pro and SuperReport Pro.

Line spacing is used for space between lines.

It is computed from the font height as (Ascent + Descent) * lineSpacing

In other words it is a percentage of the font height to use for advancing the text to the next line.

When it is 1.0 (default), next line starts right below the previous one.

For exemple, if you enter 2 as **lineSpacing** you will get (in the same cell):

Line 1

Line 2

Line 3

Instead of:

Line 1
Line 2
Line 3

Examples

```
// Format a real column (3rd column), default column justification, center header justification
PL_SetFormat(names;3;"$###,###.00";0;2;0)

// Format a string (2nd column), default column justification and default header justification
PL_SetFormat(eContacts;2;"(###) ###-####";0;0;0)

// Format a boolean column (4th column), right column justification and left header justification
PL_SetFormat(eList;4;"Male;Female";3;1;0)

// Format style 3 for a date column, default justification (5th column), default column and header
   justification, suppress null dates
PL_SetFormat(eNames;5;"3-")

// Format style 2 for a time column, right justification for header and column (7th column)
PL_SetFormat(eList;7;"&/2";3;3;0)

// Custom format style, default justification for column, center header (5th column),
   attributed text, "compatible" line spacing
PL_SetFormat(eNames;5;"|Dollars";0;2;0;1;1)

// Scale picture column to fit proportionally (1st column), use default header justification,
   use picture size in row height calculation
PL_SetFormat(eList;1;"3";0;0;1)
```

vertAlignment — Vertical alignment

- 0 — default
- 1 — top
- 2 — center
- 3 — bottom

PL_SetWidths (areaRef:L; columnNumber:I; numWidths:I; width1:I; …; widthN:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ columnNumber	integer	Column at which to set the first width
→ numWidths	integer	Number of widths to set (up to 15)
→ width1; …; widthN	integer	Pixel widths of columns

PL_SetWidths is used to set the pixel width for one or more columns. Up to fifteen widths can be set at a time.

A width of zero forces a column to be sized automatically based on its data type.

A column cannot be less than 3 pixels wide. If you pass a value of less than 3 but greater than zero, PrintList Pro will ignore it and use 3.

PrintList Pro will not let a column be wider than the width of the list area minus 20.

If not called, the default width for all columns is determined based on the type of array or field printed in the column.

Example

```
$error:=PL_SetArraysNam(eNames;1;5;"aFN";"aLN";"aCity";"aState";"aZip")
PL_SetWidths(eNames;1;5;150;50;0;100;0) // 0 forces autosizing for that column
```

PL_SetHdrStyle

PL_SetHdrStyle (areaRef:L; columnNumber:I; fontName:S; size:I; styleNum:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ columnNumber	integer	Column for which to set the header style
→ fontName	string	Name of the font to use
→ size	integer	Size of the font
→ styleNum	integer	Style of the font

PL_SetHdrStyle is used to control the appearance of the PrintList Pro column headers. The columns can be controlled individually or as a group.

columnNumber — This parameter specifies what column header to apply the style to. Use a value of zero (0) to apply the parameters to all columns.

fontName — Use this parameter to specify the font for the specified columnNumber. If not called, or the specified font name is not found, the header(s) will be printed in the OS defined System Font. If the font is not installed, then the System Font will be used.

styleNum — This parameter is a font style code. By adding the codes together, you can combine styles. The numeric codes for **styleNum** are shown below:

Style	*Number*
Plain	0
Bold	1
Italic	2
Underline	4
Outline	8
Shadow	16
Condensed	32
Extended	64

Examples

```
PL_SetHdrStyle(eList;1;"Geneva";12;1) // Geneva 12 point bold, column 1
PL_SetHdrStyle(Names;3;"New York";12;3) // New York 12 point bold italic, column 3
PL_SetHdrStyle(Names;0;"Palatino";10;3) // Palatino 10 point bold italic, all columns
```

PL_SetHdrOpts (areaRef:L; printHeaders:I; printPixelWidth:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ printHeaders	integer	Print the headers above the list
→ printPixelWidth	integer	Print column widths in the header

PL_SetHdrOpts is used to control several PrintList Pro options pertaining to column headers.

printHeaders:

- 0 — no headers will be printed (default)
- 1 — headers will be printed only on the first page
- 2 — headers will be printed on all pages

printPixelWidth — Used during development to allow you to easily determine what pixel width looks best for each column:

- 0 — the normal header text will be printed (default)
- 1 — the width of the column will be printed in each header

Examples

```
PL_SetHdrOpts(eList;2;0) // print headers on all pages, no pixel widths
PL_SetHdrOpts(eList;1;1) // print headers on first page, and pixel widths
```

PL_SetMiscOptions (areaRef:L; escapeChar:S; useEllipsis:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ escapeChar	string	Escape character (obsolete)
→ useEllipsis	integer	Use ellipsis

PL_SetMiscOptions is used to control miscellaneous PrintList Pro options.

escapeChar — Obsolete, ignored.

useEllipsis — Determines if auto-ellipsis is used when columns are smaller than the printed data:

- 0 — use ellipsis in header and column data
- 1 — don’t use ellipsis in header and column data (default)

PL_SetStyle

PL_SetStyle (areaRef:L; columnNumber:I; fontName:S; size:I; styleNum:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ columnNumber	integer	Column for which to set the style
→ fontName	string	Name of the font to use
→ size	integer	Size of the font
→ styleNum	integer	Style of the font

PL_SetStyle is used to control the appearance of the PrintList Pro columns. The columns can be controlled individually or as a group.

columnNumber — This parameter specifies what column to apply the style to. Use a value of zero (0) to apply the parameters to all columns.

fontName — Use this parameter to specify the font for the specified **columnNumber**. If not called, or the specified font name is not found, the column(s) will be printed in the OS defined System Font. If the font is not installed, then the System Font will be used.

styleNum — This parameter is a font style code. By adding the codes together, you can combine styles. The numeric codes for **styleNum** are shown below:

Style	*Number*
Plain	0
Bold	1
Italic	2
Underline	4
Outline	8
Shadow	16
Condensed	32
Extended	64

Examples

PL_SetStyle(eNames;0;"Geneva";9;0) // Geneva 9 plain, all columns

PL_SetStyle(eList;4;"Helvetica";12;32) // Helvetica 12 point condensed, 4th column

PL_SetStyle(eNames;1;"Times";9;1) // Times 9 point bold, 1st column

PL_SetForeClr

PL_SetForeClr (areaRef:L; columnNumber:I; plpHdrForeColor:S; 4dHdrForeColor:I; plpListForeColor:S; 4dListForeColor:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ columnNumber	integer	Column number
→ plpHdrForeColor	string	Header foreground color from PrintList Pro's palette
→ 4dHdrForeColor	integer	Header foreground color from 4D's palette
→ plpListForeColor	string	List foreground color from PrintList Pro's palette
→ 4dListForeColor	integer	List foreground color from 4D's palette

PL_SetForeClr is used to specify the foreground colors for a column header and a list area column.

PrintList Pro has its own palette, with the following colors: white, black, blue, green, yellow, magenta, red, cyan, gray, light gray. Color constants can be used.

columnNumber — The column for which to set the foreground color. Use a value of zero (0) to apply the parameters to all columns.

plpHdrForeColor — Name of the color in PrintList Pro's palette. This will be the foreground color for the column header. If the name is not in PrintList Pro's palette or it is a null string, then **4dHdrForeColor** will be used.

4dHdrForeColor — 1 to 256. The color at this position in 4D's palette will be used for the foreground color for the column header.

plpListForeColor — Name of the color in PrintList Pro's palette. This will be the foreground color for the column. If the name is not in PrintList Pro's palette or it is a null string, then **4dListForeColor** will be used.

4dListForeColor — 1 to 256. The color at this position in 4D's palette will be used for the foreground color for the column.

If ***PL_SetForeClr*** is not called, the default is black for both the header and list foreground colors.

Examples

```
// Red for column header foreground, light gray for column foreground (all columns)
PL_SetForeClr(eNames;0;"Red";0;"Light Gray";0)
// Green for column header foreground, 13th color from 4D's palette for column foreground (4th column)
PL_SetForeClr(eNames;4;"Green";0;"";13)
```

PL_SetForeRGBColor

PL_SetForeRGBColor (areaRef:L; columnNumber:L; hdrForeRed:L; hdrForeGreen:L; hdrForeBlue:L; listForeRed:L; listForeGreen:L; listForeBlue:L)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ columnNumber	longint	Column number
→ hdrForeRed	longint	Header fore red
→ hdrForeGreen	longint	Header fore green
→ hdrForeBlue	longint	Header fore blue
→ listForeRed	longint	List fore red
→ listForeGreen	longint	List fore green
→ listForeBlue	longint	List fore blue

PL_SetForeRGBColor is used to specify the foreground colors for a column header and a list area column, using the RGB values. This routine is similar to PL_SetForeClr.

hdrForeRed — Desired header foreground RGB red value.

hdrForeGreen — Desired header foreground RGB green value.

hdrForeBlue — Desired header foreground RGB blue value.

listForeRed — Desired list foreground RGB red value.

listForeGreen — Desired list foreground RGB green value.

listForeBlue — Desired list foreground RGB blue value.

The following example will tell PrintList Pro to print the third column using a color scheme standard for MacOS X:

```
PL_SetForeRGBColor(xArea;3;237;254;243;237;254;243)
```

PL_SetBackClr

PL_SetBackClr (areaRef:L; plpHdrBackColor:S; 4dHdrBackColor:I; plpListBackColor:S; 4dListBackColor:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ plpHdrBackColor	string	Header background color from PrintList Pro's palette
→ 4dHdrBackColor	integer	Header background color from 4D's palette
→ plpListBackColor	string	List background color from PrintList Pro's palette
→ 4dListBackColor	integer	List background color from 4D's palette

PL_SetBackClr is used to specify the background colors for the header and list area.

While the foreground color can be specified for each column, the background color for the header or the list area can only be specified for all columns using this command. You need to use PL_SetColBackColor or PL_SetColBackRGBColor to set the background colors of each column's header and each column itself.

PrintList Pro has its own palette, with the following colors: white, black, blue, green, yellow, magenta, red, cyan, gray, light gray. Color constants can be used.

plpHdrBackColor — Name of the color in PrintList Pro's palette. This will be the background color for the column header. If the name is not in PrintList Pro's palette or it is a null string, then **4dHdrBackColor** will be used.

4dHdrBackColor — 1 to 256. The color at this position in 4D's palette will be used for the background color for the column header.

plpListBackColor — Name of the color in PrintList Pro's palette. This will be the background color for the column. If the name is not in PrintList Pro's palette or it is a null string, then **4dListBackColor** will be used.

4dListBackColor — 1 to 256. The color at this position in 4D's palette will be used for the background color for the column.

If ***PL_SetBackClr*** is not called, the default is white for both the header and list background colors.

Examples

```
// Light gray for header background, white for list background, all columns
PL_SetBackClr(eNames;0;"Light Gray";0;"White";0)
// White for header background, 13th color from 4D's palette for list background, 1st column
PL_SetBackClr(eNames;1;"White";0;"";13)
```

PL_SetBackRGBColor

PL_SetBackRGBColor (areaRef:L; hdrBackRed:L; hdrBackGreen:L; hdrBackBlue:L; listBackRed:L; listBackGreen:L; listBackBlue:L)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ hdrBackRed	longint	Header back red
→ hdrBackGreen	longint	Header back green
→ hdrBackBlue	longint	Header back blue
→ listBackRed	longint	List back red
→ listBackGreen	longint	List back green
→ listBackBlue	longint	List back blue

PL_SetBackRGBColor is used to specify the background colors for the header and list area, using the RGB values. This routine is similar to PL_SetBackClr.

While the foreground color can be specified for each column, the background color for the header or the list area can only be specified for all columns using this command. You need to use PL_SetColBackColor or PL_SetColBackRGBColor to set the background colors of each column's header and each column itself.

hdrBackRed — Desired header background RGB red value.

hdrBackGreen — Desired header background RGB green value.

hdrBackBlue — Desired header background RGB blue value.

listBackRed — Desired list background RGB red value.

listBackGreen — Desired list background RGB green value.

listBackBlue — Desired list background RGB blue value.

The following example will tell PrintList Pro to print the list using a color scheme standard for MacOS X:

```
PL_SetBackRGBColor(xArea;237;254;243;237;254;243)
```

PL_SetColBackColor

PL_SetColBackColor (areaRef:L; columnNumber:I; plpHdrBackColor:S; 4dHdrBackColor:I; plpListBackColor:S; 4dListBackColor:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ columnNumber	integer	Column number
→ plpHdrBackColor	string	Header background color from PrintList Pro's palette
→ 4dHdrBackColor	integer	Header background color from 4D's palette
→ plpListBackColor	string	List background color from PrintList Pro's palette
→ 4dListBackColor	integer	List background color from 4D's palette

PL_SetColBackColor is used to specify the background colors for a column header and a list area column.

PrintList Pro has its own palette, with the following colors: white, black, blue, green, yellow, magenta, red, cyan, gray, light gray. Color constants can be used.

columnNumber — The column for which to set the background color. Use a value of zero (0) to apply the parameters to all columns.

plpHdrBackColor — Name of the color in PrintList Pro's palette. This will be the background color for the column header. If the name is not in PrintList Pro's palette or it is a null string, then **4dHdrBackColor** will be used.

4dHdrBackColor — 1 to 256. The color at this position in 4D's palette will be used for the background color for the column header.

plpListBackColor — Name of the color in PrintList Pro's palette. This will be the background color for the column. If the name is not in PrintList Pro's palette or it is a null string, then **4dListBackColor** will be used.

4dListBackColor — 1 to 256. The color at this position in 4D's palette will be used for the background color for the column.

If ***PL_SetColBackColor*** is not called, the default is white for both the header and list background colors.

Examples

```
// Light gray for header background, white for list background, all columns
PL_SetColBackColor(eNames;0;PL Light gray;0;PL White;0)
// White for header background, 13th color from 4D's palette for list background, 1st column
PL_SetColBackColor(eNames;1;PL White;0;"";13)
```

PL_SetColBackRGBColor

PL_SetColBackRGBColor (areaRef:L; columnNumber:L; hdrBackRed:L; hdrBackGreen:L; hdrBackBlue:L; listBackRed:L; listBackGreen:L; listBackBlue:L)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ columnNumber	longint	Column number
→ hdrBackRed	longint	Header back red
→ hdrBackGreen	longint	Header back green
→ hdrBackBlue	longint	Header back blue
→ listBackRed	longint	List back red
→ listBackGreen	longint	List back green
→ listBackBlue	longint	List back blue

PL_SetColBackRGBColor is used to specify the background colors for a column header and a list area column, using the RGB values. This routine is similar to PL_SetColBackColor.

columnNumber — The column for which to set the background color. Use a value of zero (0) to apply the parameters to all columns.

hdrBackRed — Desired header background RGB red value.

hdrBackGreen — Desired header background RGB green value.

hdrBackBlue — Desired header background RGB blue value.

listBackRed — Desired list background RGB red value.

listBackGreen — Desired list background RGB green value.

listBackBlue — Desired list background RGB blue value.

The following example will tell PrintList Pro to print the third column using a color scheme standard for OSX:

```
PL_SetColBackRGBColor(xArea;3;237;254;243;237;254;243)
```

PL_SetRowStyle

PL_SetRowStyle (areaRef:L; rowNumber:L; styleNum:I; fontName:S; fontSize:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ rowNumber	longint	Number of row
→ styleNum	integer	Style of the font
→ fontName	string	Name of the font
→ fontSize	integer	Size of the font

PL_SetRowStyle is used to set the style and font for a particular row. It will override the style and font settings for all columns in that row. The size settings of each column will still apply. Any subsequent sorting using PL_SetSort will cause the row style setting to be moved with the arrays. This will keep the style setting "in sync" with the original row.

Keep in mind that any settings applied to a row will be moved with that row's data if the data is later sorted using ***PL_SetSort***. If you do not want the row's settings to move, call ***PL_SetSort*** before applying the row settings.

rowNumber — The row for which to set the style. Use a value of zero (0) to apply the parameters to all rows.

styleNum — This parameter is used to set the style for the row. The different values in the table below can be added together to produce combinations of styles. For example, bold italic has a value of 3.

Style	*Number*
Plain	0
Bold	1
Italic	2
Underline	4
Outline	8
Shadow	16
Condensed	32
Extended	64

If a row style has been previously set, it may be removed by setting **styleNum** to -1. This may also be applied to all rows by passing a zero (0) for the **rowNumber**. This will have no effect on rows that have not been previously set.

The row style may be left unchanged by setting **styleNum** to 256.

fontName — This parameter specifies the font for a row. The row font may be left unchanged by setting **fontName** to the empty string (""). If the font specified is not found, it will be treated as an empty string and ignored.

fontSize — This specifies the font size for a row. The row font size may be left unchanged by setting **fontSize** to 0.

Examples

```
PL_SetRowStyle(eNames;10;2;"";0) // set row 10 to be italic - no change in font size
PL_SetRowStyle(eNames;0;1;"Helvetica";14) // set all rows to be bold, Helvetica 14
PL_SetRowStyle(eList;12;3;"Times";0) // set the 12th row to print the Times font in bold italic style
```

PL_SetRowColor

PL_SetRowColor (areaRef:L; rowNumber:L; plpRowForeColor:S; 4dRowForeColor:L; plpRowBackColor:S; 4dRowBackColor:L)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ rowNumber	longint	Number of row
→ plpRowForeColor	string	Row foreground color from PrintList Pro's palette
→ 4dRowForeColor	longint	Row foreground color from 4D's palette
→ plpRowBackColor	string	Row background color from PrintList Pro's palette
→ 4dRowBackColor	longint	Row background color from 4D's palette

PL_SetRowColor is used to specify the foreground and background colors for a row. It will override the foreground and background color settings for all columns in that row. Any subsequent sorting using PL_SetSort will cause the row color setting to be moved with the arrays. This will keep the color setting "in sync" with the original row.

Keep in mind that any settings applied to a row will be moved with that row's data if the data is later sorted using ***PL_SetSort***. If you do not want the row's settings to move, call ***PL_SetSort*** before applying the row settings.

PrintList Pro has its own palette, with the following colors: white, black, blue, green, yellow, magenta, red, cyan, gray, light gray. Color constants can be used.

rowNumber — The row for which to set the foreground color. Use a value of zero (0) to apply the parameters to all rows.

plpRowForeColor — Name of the color in PrintList Pro's palette. This will be the foreground color for the row. If the name is not in PrintList Pro's palette or it is a null string, then **4dRowForeColor** will be used.

4dRowForeColor — 1 to 256. Foreground color number for the row (from 4D's palette). The row foreground color may be left unchanged by setting **plpRowForeColor** to the empty string (""), and **4dRowForeColor** to 0.

If a row color has been previously set, it may be removed by setting **plpRowForeColor** to an empty string (""), and **4dRowForeColor** to -1. This may also be applied to all rows by passing a zero (0) for the **rowNumber**. This will have no effect on rows that have not been previously set.

plpRowBackColor — Name of the color in PrintList Pro's palette. This will be the background color for the row. If the name is not in PrintList Pro's palette or it is the empty string (""), then **4dRowBackColor** will be used.

4dRowBackColor —1 to 256. Background color number for the row (from 4D's palette). The row background color may be left unchanged by setting **plpRowBackColor** to the empty string (""), and **4dRowBackColor** to 0.

If a row background color has been previously set, it may be removed by setting **plpRowBackColor** to the empty string (""), and **4dRowBackColor** to -1. This may also be applied to all rows by passing a zero (0) for the **rowNumber**. This will have no effect on rows that have not been previously set.

Examples

PL_SetRowColor(eNames;10;"Blue";0;"Light gray";0) // set row 10 to foreground blue, background light gray

PL_SetRowColor(eNames;0;"Blue";0;"Yellow";0) // set all rows to blue foreground, yellow background

PL_SetRowColor(eNames;0;"";-1;"";-1) // reset all row colors to use the column color settings

PL_SetRowColor(eList;10;"Blue";0;"Light Gray";0) // set the 10th row to print a foreground color of blue and background color of light gray

PL_SetRowColor(eList;12;"Green";0;"";0) // set the 12th row to print a foreground color of green and the current background color

---

PL_SetRowRGBColor (areaRef:L; rowNumber:L; rowForeRed:L; rowForeGreen:L; rowForeBlue:L; rowBackRed:L; rowBackGreen:L; rowBackBlue:L)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ rowNumber	longint	Row number
→ rowForeRed	longint	Foreground red
→ rowForeGreen	longint	Foreground green
→ rowForeBlue	longint	Foreground blue
→ rowBackRed	longint	Background red
→ rowBackGreen	longint	Background green
→ rowBackBlue	longint	Background blue

PL_SetRowRGBColor provides the ability to set the foreground and background colors for an individual row using standard RGB colors. This routine is similar to PL_SetRowColor, except that it uses RGB color values.

rowForeRed — Desired foreground RGB red value.

rowForeGreen — Desired foreground RGB green value.

rowForeBlue — Desired foreground RGB blue value.

rowBackRed — Desired background RGB red value.

rowBackGreen — Desired background RGB green value.

rowBackBlue — Desired background RGB blue value.

The following example will tell PrintList Pro to print the third row using a color scheme standard for MacOS X:

PL_SetRowRGBColor(xArea;3;237;0;243;0;254;0)

PL_SetDividers

PL_SetDividers (areaRef:L; colDividerWidth:F; colDividerPattern:S; plpColDividerColor:S; 4dColDividerColor:I; rowDividerWidth:F; rowDividerPattern:S; plpRowDividerColor:S; 4dRowDividerColor:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ colDividerWidth	real	Width of the column divider line
→ colDividerPattern	string	Pattern of the column divider
→ plpColDividerColor	string	Color from PrintList Pro's palette for the column divider
→ 4dColDividerColor	integer	Color from 4D's palette for the column divider
→ rowDividerWidth	real	Width of the row divider line
→ rowDividerPattern	string	Pattern of the row divider
→ plpRowDividerColor	string	Color from PrintList Pro's palette for the row divider
→ 4dRowDividerColor	integer	Color from 4D's palette for the row divider

PL_SetDividers is used to set the pattern (transparency ratio) and color of the column and row dividers.

These are the available patterns: white, black, gray, light gray, and dark gray. See the Patterns item in the Compatibility Notes.

PrintList Pro has its own palette, with the following colors: white, black, blue, green, yellow, magenta, red, cyan, gray, light gray. Color constants can be used.

colDividerWidth — 0 to 1. This option controls the line width of the column dividers. A value of 0.25 pixel should be used for hairlines. A value of 0 means that no dividers will be printed.

colDividerPattern — Name of the pattern (transparency ratio) for the column divider. If a null string is used then no column divider will be printed.

plpColDividerColor — Name of the color in PrintList Pro's palette. This will be the color for the column divider. If the name is not in PrintList Pro's palette or it is a null string, then **4dColDividerColor** will be used.

4dColDividerColor — 1 to 256. The color at this position in 4D's palette will be used for the column divider.

rowDividerWidth — 0 to 1. This option controls the line width of the row dividers. A value of 0.25 pixel should be used for hairlines. A value of 0 means that no dividers will be printed.

rowDividerPattern — Name of the pattern (transparency ratio) for the row divider. If a null string is used then no row divider will be printed.

plpRowDividerColor — Name of the color in PrintList Pro's palette for the row divider. If the name is not in PrintList Pro's palette or it is a null string, then **4dRowDividerColor** will be used.

4dRowDividerColor — 1 to 256. The color at this position in 4D's palette will be used for the row divider.

If neither ***PL_SetDividers*** nor PL_SetRGBDividers are called, then no column or row dividers will be printed.

Examples

```
// Print solid gray column dividers and no row dividers
PL_SetDividers(eNames;1;"Black";"Gray";0;0;"";"";0)
// Print column and row hairline dividers in a gray pattern
PL_SetDividers(eNames;0.25;"Gray";"Black";0;0.25;"Gray";"Black";0)
```

PL_SetRGBDividers (areaRef:L; colDividerWidth:F; colDividerPattern:S; colDividerRed:L; colDividerGreen:L; colDividerBlue:L; rowDividerWidth:F; rowDividerPattern:S; rowDividerRed:L; rowDividerGreen:L; rowDividerBlue:L)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ colDividerWidth	real	Width of the column divider line
→ colDividerPattern	string	Column divider pattern string
→ colDividerRed	longint	Column divider — Red
→ colDividerGreen	longint	Column divider — Green
→ colDividerBlue	longint	Column divider — Blue
→ rowDividerWidth	real	Width of the row divider line
→ rowDividerPattern	string	Row divider pattern string
→ rowDividerRed	longint	Row divider — Red
→ rowDividerGreen	longint	Row divider — Green
→ rowDividerBlue	longint	Row divider — Blue

PL_SetRGBDividers functions the same as the PL_SetDividers routine, except that the column and row divider colors use standard RGB values.

colDividerWidth — 0 to 1. This option controls the line width of the column dividers. A value of 0.25 pixel should be used for hairlines. A value of 0 means that no dividers will be printed.

colDividerPattern — String, name of the pattern (transparency ratio) for the column divider. If a null string is used then no column divider will be printed.

colDividerRed — Column divider RGB red value.

colDividerGreen — Column divider RGB green value.

colDividerBlue — Column divider RGB blue value.

rowDividerWidth — 0 to 1. This option controls the line width of the row dividers. A value of 0.25 pixel should be used for hairlines. A value of 0 means that no dividers will be printed.

rowDividerPattern — String, name of the pattern (transparency ratio) for the row divider. If a null string is used then no row divider will be printed.

rowDividerRed — Row divider RGB red value.

rowDividerGreen — Row divider RGB green value.

rowDividerBlue — Row divider RGB blue value.

If neither PL_SetDividers nor ***PL_SetRGBDividers*** are called, then no column or row dividers will be printed.

The following example will set the column/row dividers using the ***PL_SetRGBDividers*** routine:

```
// Print column and row dividers in a hairline gray pattern
PL_SetRGBDividers(eNames;0.25;"Gray";209; 209; 209;0.25;"Gray"; 209; 209; 209)
```

PL_SetFrame (areaRef:L; frameLineWidth:F; frameLinePattern:S; plpFrameLineColor:S; 4dFrameLineColor:I; headerLineWidth:F; headerLinePattern:S; plpHeaderLineColor:S; 4dHeaderLineColor:I)

Parameter	*Type*	*Description*
areaRef	longint	Reference of PrintList Pro object on layout
frameLineWidth	real	Width of the frame line
frameLinePattern	string	Pattern of the frame line
plpFrameLineColor	string	Color from PrintList Pro's palette for the frame
4dFrameLineColor	integer	Color from 4D's palette for the frame
headerLineWidth	real	Width of the header separator
headerLinePattern	string	Pattern of the header separator
plpHeaderLineColor	string	Color from PrintList Pro's palette for the header
4dHeaderLineColor	integer	Color from 4D's palette for the header separator

PL_SetFrame is used to set the pattern (transparency ratio) and color of the frame and header separator lines.

These are the available patterns: white, black, gray, light gray, and dark gray. See the Patterns item in the Compatibility Notes.

PrintList Pro has its own palette, with the following colors: white, black, blue, green, yellow, magenta, red, cyan, gray, light gray. Color constants can be used.

frameLineWidth — 0 to 1. This option controls the line width of the frame. A value of 0.25 pixel should be used for hairlines. A value of 0 means that no frame will be printed.

frameLinePattern — Name of the pattern (transparency ratio) for the frame. If a null string is used then no frame will be printed.

plpFrameLineColor — Name of the color in PrintList Pro's palette. This will be the color for the frame. If the name is not in PrintList Pro's palette or it is a null string, then **4dFrameLineColor** will be used.

4dFrameLineColor — 1 to 256. The color at this position in 4D's palette will be used for the frame.

headerLineWidth — 0 to 1. This option controls the line width of the header separator. A value of 0.25 pixel should be used for hairlines. A value of 0 means that no header separator will be printed.

headerLinePattern — Name of the pattern (transparency ratio) for the header separator. If a null string is used then no header separator will be printed.

plpHeaderLineColor — Name of the color in PrintList Pro's palette for the header separator. If the name is not in PrintList Pro's palette or it is a null string, then **4dHeaderLineColor** will be used.

4dHeaderLineColor — 1 to 256. The color at this position in 4D's palette will be used for the header separator.

If neither ***PL_SetFrame*** nor PL_SetRGBFrame are called, then no frame or header separator line will be printed.

Examples

```
// Print 1 pixel wide, solid gray header separator and no frame
PL_SetFrame (eNames;0;"";"";0;1;"Black";"Gray";0)
// Print hairline, solid black frame and header separator line
PL_SetFrame (eNames;0.25;"Black";"Black";0;0.25;"Black";"Black";0)
```

PL_SetRGBFrame (areaRef:L; frameLineWidth:F; frameLinePattern:S; frameLineRed:L; frameLineGreen:L; frameLineBlue:L; headerLineWidth:F; headerLinePattern:S; headerLineRed:L; headerLineGreen:L; headerLineBlue:L)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ frameLineWidth	real	Width of the frame line
→ frameLinePattern	string	Pattern of the frame line
→ frameLineRed	longint	Frame line — Red
→ frameLineGreen	longint	Frame line — Green
→ frameLineBlue	longint	Frame line — Blue
→ headerLineWidth	real	Width of the header separator
→ headerLinePattern	string	Pattern of the header separator
→ headerLineRed	longint	Header separator — Red
→ headerLineGreen	longint	Header separator — Green
→ headerLineBlue	longint	Header separator — Blue

PL_SetRGBFrame functions the same as the PL_SetFrame routine, except that the frame and header separator colors use standard RGB values.

frameLineWidth — 0 to 1. This option controls the line width of the frame. A value of 0.25 pixel should be used for hairlines. A value of 0 means that no frame will be printed.

frameLinePattern — Name of the pattern (transparency ratio) for the frame. If a null string is used then no frame will be printed.

frameLineRed — Frame line RGB red value.

frameLineGreen — Frame line RGB green value.

frameLineBlue — Frame line RGB blue value.

headerLineWidth — 0 to 1. This option controls the line width of the header separator. A value of 0.25 pixel should be used for hairlines. A value of 0 means that no header separator will be printed.

headerLinePattern — Name of the pattern (transparency ratio) for the header separator. If a null string is used then no header separator will be printed.

headerLineRed — Header separator RGB red value.

headerLineGreen — Header separator RGB green value.

headerLineBlue — Header separator RGB blue value.

If neither PL_SetFrame nor ***PL_SetRGBFrame*** are called, then no frame or header separator line will be printed.

The following example sets the frame and header separator line using ***PL_SetRGBFrame***:

```
// Print frame and header separator line in a hairline gray pattern
PL_SetRGBFrame(eNames;0.25;"Gray";209; 209; 209;0.25;"Gray"; 209; 209; 209)
```

PL_SetHeight (areaRef:L; numHeaderLines:I; headerHeightPad:I; numRowLines:I; rowHeightPad:I; minimumHeight:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ numHeaderLines	integer	Number of text lines in the header
→ headerHeightPad	integer	Extra height for the header
→ numRowLines	integer	Number of text lines in each row
→ rowHeightPad	integer	Extra height for each row
→ minimumHeight	integer	Minimum pixel height remaining on the page

PL_SetHeight is used to set the number of lines of text along with additional height padding in the header and in the rows. Only text and string columns can wrap to more than one line.

If **numRowLines** is set to 2 or more, text and string elements will be able to wrap into the number of lines specified for each row. Note that all rows will be given the same number of lines regardless of the actual number of lines used by a specific text or string element.

Additional padding may be set using **rowHeightPad** to allow more space between rows. Text will be centered vertically in the header or row. Note that the padding applies to the entire row and not on a line by line basis within the row.

numHeaderLines — The number of lines in the header. Default is 1.

headerHeightPad — The extra height, in pixels, to give to the header. Default is 2.

numRowLines — The number of lines to give to each row. A value greater than 0 means that the height of each row is the same. The fixed height will either be a function of the number of text lines specified or the height of the largest picture in a picture array if so configured (refer to PL_SetFormat). A value of zero means that the height of each row is to be calculated automatically based on the data that is to be printed. PrintList Pro examines the elements of all text, string, and picture arrays to determine the height of each row. Default is 1.

rowHeightPad — The extra height, in pixels, to give to each row. Default is 0.

minimumHeight — The minimum remaining available height, in pixels, for the PrintList Pro area to print on the page. For example, if there are several PrintList Pro areas on one form, and you want to make sure that at least two rows are printed on one page for the area specified by **areaRef**, and the row height is 12 points, you can set this parameter to 24. PrintList Pro will test if it has 24 pixels (two rows) left available on the page before printing the area. If not, it will proceed onto the following page. You should specify at least the height of one row in this parameter.

Examples

PL_SetHeight(eList;1;4;1;2) // pad the header by 4 pixels and the rows by 2

PL_SetHeight(eList;2;5;2;0) // set header lines to 2, pad to 5 pixels, set row lines to 2, no padding

PL_SetHeight(eList;1;4;1;2;12) // check that 12 pixels (one row height here) are available before printing

---

PL_SetSort (areaRef:L; column1:I; …; columnN:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ column1; …; columnN	integer	Column(s) to perform sort upon

PL_SetSort is used to perform a multi-level sort.

column — These parameters specify the columns to use for the sort criteria.

A column greater than 0 causes an ascending sort to be performed upon that column, while a column less than 0 causes a descending sort to be performed upon that column.

If a column is 0, then all successive columns will be ignored.

If the arrays are already sorted, use PL_SetBrkOrder instead to communicate the sort order to PrintList Pro.

Examples

PL_SetSort(eNames;3;4;7) // sort on columns 3, 4, and 7 (all ascending)

PL_SetSort(eContacts;-1;3;-2) // sort on columns 1 (descending), 3 (ascending), and 2 (descending)

PL_SetColOpts

PL_SetColOpts (areaRef:L; hideLastColumns:I; hideDetailArea:I; drawingEngine:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ hideLastColumns	integer	Number of columns from the right to hide
→ hideDetailArea	integer	Hide the list and just show the breaks
→ drawingEngine	integer	drawing engine (ignored on Mac) GDI: better rendering, no transparency, no horizontal scaling, limited text rotation features GDI+: allows the three features above, but may affect precise rendering on Windows

PL_SetColOpts is used to hide columns from being printed and to hide the entire detail area to show just break level information.

hideLastColumns — This parameter specifies the number of arrays from the right to not print. This parameter is useful for keeping many arrays "in sync" when sorting, but only a subset are to be printed. Default is 0.

hideDetailArea — 0 or 1:

- 0 — print the array values in the list (default)
- 1 — do not print the array values in the list — this is useful for printing a summary of break level information without printing the actual list

drawingEngine (ignored on Mac):

- GDI: better rendering, no transparency, no horizontal scaling, limited text rotation features
- GDI+: allows the three features above, but may affect precise rendering on Windows

This parameter is only meaningful on Windows. The two possible values are:

- 0 — use GDI+ (default)
- 1 — change the engine used for printing on Windows to GDI

Examples

PL_SetColOpts (eList;2;0) // hide the last two columns

PL_SetColOpts (eList;0;1;1) // hide the detail area, show only the breaks, use GDI on Windows

PL_SetCellStyle

PL_SetCellStyle (areaRef:L; firstCellCol:I; firstCellRow:L; lastCellCol:I; lastCellRow:L; cellArray:X; styleNum:I; fontName:S; fontSize:I)

Parameter	*Type*	*Description*
areaRef	longint	Reference of PrintList Pro object on layout
firstCellCol	integer	First cell column
firstCellRow	longint	First cell row
lastCellCol	integer	Last cell column
lastCellRow	longint	Last cell row
cellArray	two-dimensional longint array	Discontiguous cells
styleNum	integer	Style of the font
fontName	string	Name of the font
fontSize	integer	Size of the font

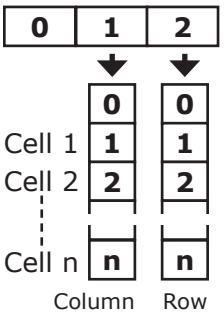
PL_SetCellStyle is used to set the font and/or style of a specific cell, range of cells, or list of cells.

To specify a single cell: if **firstCellCol** and **firstCellRow** are greater than 0 and **lastCellCol** or **lastCellRow** are less than or equal to 0 then only [**firstCellCol**, **firstCellRow**] will be set.

To specify a range of cells: if **firstCellCol** and **firstCellRow** are greater than 0 and **lastCellCol** and **lastCellRow** are greater than 0 then the range of cells from [**firstCellCol**, **firstCellRow**] to [**lastCellCol**, **lastCellRow**] will be set.

To specify discontiguous cells: if **firstCellCol** or **firstCellRow** are less than or equal to 0 then the cells in **cellArray** will be set.

cellArray — Two-dimensional long integer array. The first dimension must be two. The first array is for the column indices and the second array is for the row indices. The second dimension must be the same as the number of cells that are to be selected. See the following illustration.



styleNum —This parameter is used to set the style for the specified cells. The values shown below can be added together to combine styles.

Style	*Number*
Plain	0
Bold	1
Italic	2
Underline	4
Outline	8
Shadow	16
Condensed	32
Extended	64

If a cell style has been previously set, the style may be removed by setting **styleNum** to -1. The cell style may be left unchanged by setting **styleNum** to 256.

fontName — This specifies the font for a cell. The cell font may be left unchanged by setting **fontName** to the empty string (""). If the specified font is not found, it will be treated as an empty string and ignored.

fontSize — This specifies the font size for a cell. The cell font size may be left unchanged by setting **fontSize** to 0.

Keep in mind that any settings applied to a cell will be moved with that cell's data if the data is later sorted using PL_SetSort. If you do not want the cell's settings to move, call ***PL_SetSort*** before applying the cell settings.

Example

```
ARRAY LONGINT(aCellSet;2;4)
 // Set cell at column 1, row 3 to bold Helvetica - no change in font size
PL_SetCellStyle(eArea;1;3;0;0;aCellSet;1;"Helvetica";0)
 // Set cells from column 2, row 2 to column 5, row 5 to font size 14, no change in style and font
PL_SetCellStyle(eArea;2;2;5;5;aCellSet;256;"";14)
 // Set the cells in aCellSet to Times
aCellSet{1}{1}:=1 // column 1, row 1
aCellSet{2}{1}:=1
aCellSet{1}{2}:=1 // column 1, row 2
aCellSet{2}{2}:=2
aCellSet{1}{3}:=2 // column 2, row 5
aCellSet{2}{3}:=5
aCellSet{1}{4}:=2 // column 2, row 6
aCellSet{2}{4}:=6
PL_SetCellStyle(eArea;0;0;0;0;aCellSet;256;"Times";0)
```

PL_SetCellColor

PL_SetCellColor (areaRef:L; firstCellCol:I; firstCellRow:L; lastCellCol:I; lastCellRow:L; cellArray:X; plpForeColor:S; 4dForeColor:I; plpBackColor:S; 4dBackColor:I)

Parmeter	*Type*	*Description*
areaRef	longint	Reference of PrintList Pro object on layout
firstCellCol	integer	First cell column
firstCellRow	longint	First cell row
lastCellCol	integer	Last cell column
lastCellRow	longint	Last cell row
cellArray	two-dimensional longint array	Discontiguous cells
plpForeColor	string	Foreground color from PrintList Pro's palette
4dForeColor	integer	Foreground color from 4D's palette
plpBackColor	string	Background color from PrintList Pro's palette
4dBackColor	integer	Background color from 4D's palette

PL_SetCellColor is used to set the foreground color and/or background color of a specific cell, range of cells, or list of cells.

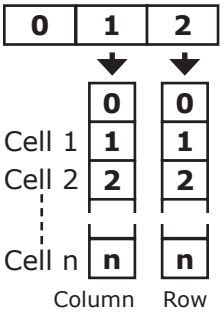
PrintList Pro has its own palette, with the following colors: white, black, blue, green, yellow, magenta, red, cyan, gray, light gray. Color constants can be used.

To specify a single cell: if **firstCellCol** and **firstCellRow** are greater than 0 and **lastCellCol** or **lastCellRow** are less than or equal to 0 then only [**firstCellCol**, **firstCellRow**] will be set.

To specify a range of cells: if **firstCellCol** and **firstCellRow** are greater than 0 and **lastCellCol** and **lastCellRow** are greater than 0 then the range of cells from [**firstCellCol**, **firstCellRow**] to [**lastCellCol**, **lastCellRow**] will be set.

To specify discontiguous cells: if **firstCellCol** or **firstCellRow** are less than or equal to 0 then the cells in **cellArray** will be set.

cellArray — Two-dimensional long integer array. The first dimension must be two. The first array is for the column indices and the second array is for the row indices. The second dimension must be the same as the number of cells that are to be selected. See the following illustration.



plpForeColor — Name of the color in PrintList Pro's palette. This will be the foreground color for the cell. If the name is not in PrintList Pro's palette or it is the empty string (""), then **4dForeColor** will be used.

4dForeColor — 1 to 256. Foreground color number for the cell (from 4D's palette). If a cell foreground color has been previously set, it may be removed by setting **plpForeColor** to the empty string (""), and **4dForeColor** to 1. The cell foreground color may be left unchanged by setting **plpForeColor** to the empty string (""), and **4dForeColor** to 0.

plpBackColor — Name of the color in PrintList Pro's palette. This will be the background color for the cell. If the name is not in PrintList Pro's palette or it is the empty string (""), then **4dBackColor** will be used.

4dBackColor — 1 to 256. Background color number for the cell (from 4D's palette). If a cell background color has been previously set, it may be removed by setting **plpBackColor** to the empty string (""), and **4dBackColor** to 1. The cell background color may be left unchanged by setting **plpBackColor** to the empty string (""), and **4dBackColor** to 0.

Keep in mind that any settings applied to a cell will be moved with that cell's data if the data is later sorted using PL_SetSort. If you do not want the cell's settings to move, call ***PL_SetSort*** before applying the cell settings.

Example

```
ARRAY LONGINT(aCellArray;2;0) // MUST initialize a two-dimensional long integer array
 // Set the foreground color of the cell at column 1, row 3 to blue
PL_SetCellColor (eList;1;3;0;0;aCellArray;"blue";0;"";0)
 // Set background color of cells from column 2, row 2 to column 5, row 5 to green
PL_SetCellColor (eList;2;2;5;5;aCellArray;"";0;"Green";0)
 // Set all negative values in the third column, a real array, to have a foreground color of red
For($i;1;Size of array(aRevenue)) // check each element in the array
  If(aRevenue{$i}<0) // is the value in this element negative?
    PL_SetCellColor(eList;3;$i;0;0;aCellArray;"Red";0;"";0) // if so, then print it in red
  End if
End for
```

PL_SetCellRGBColor

PL_SetCellRGBColor (areaRef:L; firstCellCol:I; firstCellRow:L; lastCellCol:I; lastCellRow:L; cellArray:X; cellForeRed:L; cellForeGreen:L; cellForeBlue:L; cellBackRed:L; cellBackGreen:L; cellBackBlue:L)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ firstCellCol	integer	First cell column
→ firstCellRow	longint	First cell row
→ lastCellCol	integer	Last cell column
→ lastCellRow	longint	Last cell row
→ cellArray	two-dimensional longint array	Discontiguous cells
→ cellForeRed	longint	Foreground red
→ cellForeGreen	longint	Foreground green
→ cellForeBlue	longint	Foreground blue
→ cellBackRed	longint	Background red
→ cellBackGreen	longint	Background green
→ cellBackBlue	longint	Background blue

PL_SetCellRGBColor is used to set the foreground and/or background color of a specific cell, range of cells, or list of cells. This routine works in the same manner as PL_SetCellColor, except it allows you to specify the colors using standard RGB values.

cellForeRed — Desired foreground RGB red value.

cellForeGreen — Desired foreground RGB green value.

cellForeBlue — Desired foreground RGB blue value.

cellBackRed — Desired background RGB red value.

cellBackGreen — Desired background RGB green value.

cellBackBlue — Desired background RGB blue value.

PL_SetCellIcon

PL_SetCellIcon (areaRef:L; cellColumn:I; cellRow:L; pictRef:P; iconAlignment:I; horPosition:I; vertPosition:I; offsetOrWidth:L; scaling:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ cellColumn	integer	Column at which to set the icon
→ cellRow	longint	Row at which to set the icon (0 to set the header)
→ iconRef	longint	Reference of the icon or picture to use
→ iconAlignment	integer	Position of icon
→ horPosition	integer	Horizontal position
→ vertPosition	integer	Vertical position
→ offsetOrWidth	longint	Pixel offset, or icon width depending on horPosition
→ scaling	integer	Scaling

PL_SetCellIcon provides the ability to procedurally print icons in individual cells.

One or two icons may be used (left and right). You can customize the icon(s) using items from the 4D Picture Library (see details below).

cellColumn — Desired cell column number.

cellRow — Desired cell row number (or 0 to set the header).

iconRef — Reference of the icon or picture to use from the Picture Library. To associate an icon to the cell, pass the reference number of a picture from the Design environment Picture Library. Pass zero (0) if you do not want any icon for the cell.

See Header/Cell Icon Support for examples.

iconAlignment — Position of icon (each cell can contain up to two icons):

- 0 — places icon on left of cell
- 1 — places icon on right of cell

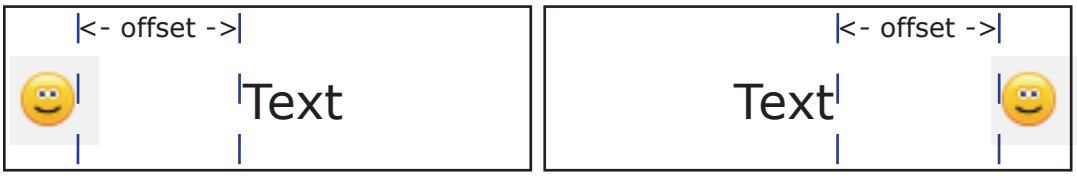
horPosition — One the following options:

- 0 — default (left for left icon, right for right icon)
- 1 — align left
- 2 — align center
- 3 — align right

vertPosition — One the following options:

- 0 — default (top)
- 1 — align top left
- 2 — align center
- 3 — align bottom

offsetOrWidth — when horizontal alignment in **horPosition** is zero (default position : left for left icon, right for right icon), the **offsetOrWidth** is the offset, i.e. the distance in pixels between the text and the icon (left or right):



horPosition = 0

Otherwise the **offsetOrWidth** is the pixel width that the icon will use - the icon will be aligned in this space:

horPosition = 2 (centered)

scaling — One the following options:

- 0 — truncated
- 1 — scaled

The cell content (text) is printed into the space that is left once the icon is printed.

For example, if the column width is 100 pixels and you print a 15 pixel icon, the remaining width can be calculated as 100 minus the padding (default horizontal indent is 3 for header and data rows on both sides = 6 points), minus the column divider if shown (1 point): 100 - 6 - 1 - 15 = 78 points where the text will be printed.

The following example will print an icon in r3c2, using an item (ID 1717) from the 4D Picture Library:

```
$col:=2
$row:=3
$iconRef:=1717
$iconPos:=1 // right
$horPos:=0 // default
$verPos:=2 // align center
$offset:=5
$scaling:=0
PL_SetCellIcon(ePLOutput;$col;$row;$iconRef;$iconPos;$horPos;$verPos;$offset;$scaling)
```

PL_SetCellBorder

PL_SetCellBorder (areaRef:L; cellColumn:I; cellRow:L; borderLeft:I; borderTop:I; borderRight:I; borderBottom:I; offset:I; width:F; redColor:I; greenColor:I; blueColor:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ cellColumn	integer	Column
→ cellRow	longint	Row
→ borderLeft	integer	Print left border
→ borderTop	integer	Print top border
→ borderRight	integer	Print right border
→ borderBottom	integer	Print bottom border
→ offset	integer	Offset from cell boundary in pixels
→ width	real	Width of line
→ redColor	integer	Red
→ greenColor	integer	Green
→ blueColor	integer	Blue

PL_SetCellBorder provides the ability to set the border style and RGB color for a cell.

cellColumn — Column of cell where border will be applied.

cellRow — Row of cell where border will be applied.

borderLeft — Print left border.

borderTop — Print top border.

borderRight — Print right border.

borderBottom — Print bottom border.

offset — Offset from cell boundary in pixels. 0 if the border should be printed at cell boundary (default).

width — Width of line. This parameter is a real value, allowing fractional widths. See Hairline Line Width.

redColor — RGB red value used for the border.

greenColor — RGB green value used for the border.

blueColor — RGB blue value used for the border.

PL_SetCellFrame

PL_SetCellFrame (areaRef:L; firstCellCol:I; firstCellRow:L; lastCellCol:I; lastCellRow:L; offset:I; width:F; redLightColor:I; greenLightColor:I; blueLightColor:I; redDarkColor:I; greenDarkColor:I; blueDarkColor:I; clearAllBorders:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ firstCellCol	integer	First cell column
→ firstCellRow	longint	First cell row
→ lastCellCol	integer	Last cell column
→ lastCellRow	longint	Last cell row
→ offset	integer	Offset from cell boundary in pixels
→ width	real	Width of line
→ redLightColor	integer	Red (light color)
→ greenLightColor	integer	Green (light color)
→ blueLightColor	integer	Blue (light color)
→ redDarkColor	integer	Red (dark color)
→ greenDarkColor	integer	Green (dark color)
→ blueDarkColor	integer	Blue (dark color)
→ clearAllBorders	integer	Clear all borders within the frame

PL_SetCellFrame prints a frame around a range of cells. It uses RGB colors: light color for both left and top lines, dark color for both right and bottom line.

The range of cells from [**firstCellCol**, **firstCellRow**] to [**lastCellCol**, **lastCellRow**] will be set.

offset — Offset from cell boundaries in pixels. 0 if the frame should be printed at cell boundaries (default).

width — Width of line. This parameter is a real value, allowing fractional widths. See Hairline Line Width.

redLightColor, **greenLightColor**, **blueLightColor** — RGB values used for both left and top lines colors.

redDarkColor, **greenDarkColor**, **blueDarkColor** — RGB values used for both right and bottom lines colors.

clearAllBorders — It this parameter value is 1, then all cells inside the frame will have their borders removed.

PL_SetPageProc

PL_SetPageProc (areaRef:L; callbackMethod:S)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ callbackMethod	string	Name of the page callback project method

PL_SetPageProc is used to specify a 4D project method to be called at the end of PrintList Pro's processing on every page. Keep in mind that a PrintList Pro page is not necessarily equivalent to a physical page.

It is possible to have several occurrences of a PrintList Pro object for a single page. Each occurrence will invoke the callback method at the end of its page.

callbackMethod — The name of the callback method that is called at the end of every PrintList Pro page.

You must use the following declaration in your callback method:

```
C_LONGINT($1;$2)
```

PrintList Pro will pass the method specified by **callbackMethod** two parameters: the first indicates which PrintList Pro area is calling the method, and the second specifies the last row printed on that page.

Example

```
PL_SetPageProc(eList;"MyCallback")
```

PL_GetVersion -> version:T

Parameter	*Type*	*Description*
← version	text	Version of the PrintList Pro plugin

Note that getting this property will not trigger the registration dialog if PrintList Pro is not registered (allows to check version before registering)

Example

```
C_TEXT($version)
$version:=PL_GetVersion
```

PL_Load / PL_Save

PL_Load (areaRef:L; XML:T) -> result:L

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ XML	text	XML data that was saved using the ***PL_Save*** command
← result	longint	0 if the XML was loaded OK; 1 if not

Initialize an area from an XML (using UTF-8) text that was saved to a text field or variable using the PL_Save command or ***AL_Save*** (from AreaList Pro).

PL_Load can be used without any other command use (e.g. no defined columns - they will be read from the XML).

Do not call ***PL_Load*** more than once for the same area: it is not intended for that and many properties are not reinitialized to defaults.

Example

This example initializes a PrintList Pro area using settings that were saved into a field in the database.

```
$err:=PL_Load (area;[Settings]PLP_template)
```

PL_Save (areaRef:L; XML:T) -> result:L

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ XML	text	A variable or field to save an area's XML settings into
← result	longint	0 if the XML was saved OK; 2 if not

Save an area's settings as XML (using UTF-8) in a text variable or field.

Use ***PL_Save*** after configuring the area but before printing. PrintList Pro modifies properties during printing - you would not get the original settings.

Example

Save a PrintList Pro area's settings into a field in the database.

```
C_TEXT($Settings)
$err:=PL_Save (area;$Settings)
[Settings]PLP_template:=$Settings
```

Using the Callback Methods

A “callback” is a 4D project method which is executed by a plug-in. PrintList Pro lets you make use of callbacks when printing a PrintList Pro object.

Summary

PrintList Pro provides five different callback methods:

- when the end of a printed page is reached (**callbackMethod** parameter of PL_SetPageProc)
- custom calculations in a break (**functionName** parameter of PL_SetBrkFunc)
- custom calculations in a break header (**functionName** parameter of PL_SetBkHFunc)
- calculated columns (**calcCallback** parameter of PL_SetCalcCall) in field display or array display mode
- computed breaks, with or without printing (**callbackMethodName** parameter of PL_ProcessArrays)

Warnings

- Callback methods may use most 4D commands, but should not call any PrintList Pro commands or any 4D commands that affect the arrays. Note: this limitation does not apply to computed break callbacks.
- Callback methods should preserve the current selection of the printing layout’s file by saving and restoring the selection if necessary.
- All callbacks receive parameters, which need to be declared as documented below.

End of Page Callback

PrintList Pro makes use of a callback method to inform you when the end of a printed page is reached. This enables you to perform any necessary processing associated with the end of the page, for example, changing information printed in the footer area of that page or the header area of the next page.

Use ***PL_SetPageProc*** to specify the 4D project method PrintList Pro is to call. PrintList Pro will pass the method specified by **callbackMethod** two parameters: the first indicates which PrintList Pro area is calling the method, and the second specifies the last row printed on that page.

You must use the following declaration in your callback method:

```
C_LONGINT($1;$2)
```

Custom Calculations in a Break

PL_SetBrkFunc is used to specify the callback function for use with custom calculations. The callback function **functionName** is called whenever PrintList Pro encounters the string "\Function" within the text that is to be printed for a specific break level.

Refer to PL_SetBrkText for details on how to embed the custom calculation string.

PrintList Pro passes information needed for the custom calculation to the callback function.

You must use the following declarations in your callback method:

```
C_INTEGER ($1;$2) //break level, column
C_STRING (82;$3) //column format
C_LONGINT($4;$5) //start row, end row
C_TEXT ($0) //custom calculation result to print
```

Custom Calculations in a Break Header

A break header will print information just prior to the group of related values.

PL_SetBkHFunc is used to specify the name of the break header callback function. This function will be called for any break header that contains a break function.

Refer to ***PL_SetBrkText*** and PL_SetBkHText to determine how to set a break function for a break level. The syntax of this command is identical to that of ***PL_SetBrkFunc***.

The callback function **functionName** is called whenever PrintList Pro encounters the string "\Function" within the text that is to be printed for a specific break level. PrintList Pro passes information needed for the custom calculation to the callback function.

You must use the following declarations in your callback method:

```
C_INTEGER ($1;$2) //break level, column
C_STRING (82;$3) //column format
C_LONGINT($4;$5) //start row, end row
C_TEXT ($0) //custom calculation result to print
```

Calculated Column Callback

A 4D callback may be attached to a specific column. When information is needed for this column, PrintList Pro will execute the callback to allow you to fill the column with data. This allows the printing of data calculated from one or more fields or arrays as well as any ad hoc data that is desired.

Parameter	*Description*
$1	Reference of PrintList Pro object on layout
$2	Column number
$3	Type of data in this column (field type or array type)
$4	Pointer to temporary 4D array (field mode) or an existing sized array (array mode)
$5	First row for which to calculate cell
$6	Number of cells to calculate in column

The first three parameters are not absolutely necessary to determine how to fill the column. They are provided to give you more flexibility in the implementation of the callback method.

- The first parameter is the area long integer reference. This gives you the ability to use this callback method for more than one PrintList Pro object.
- The second parameter is the column number. This gives you the ability to use this callback method for many columns within a PrintList Pro object.
- The third parameter is the type of data in the column (field type or array type).

The last three parameters are absolutely necessary.

- In field mode, the fourth parameter is a pointer to one of the temporary 4D Arrays used internally by PrintList Pro. This is where you will load the data to be printed in the column. In array mode, this is a declared, fully sized 4D array (by you as the developer), you have to fill the requested elements
- The fifth parameter is the number of the first cell that needs to be filled in the column. This is the same as the selected number of the row that contains this cell.
- The sixth parameter is the number of cells (rows) to be filled in the column.

You must declare all six parameters ($1 to $6) in the calculated column callback. If any of these parameters are not declared, you will get an error when compiling the database.

You must use the following declarations in your callback method:

```
C_LONGINT($1;$2;$3;$5;$6)
C_POINTER($4)
```

See Calculated Columns for details.

Computed Breaks

This powerful feature makes all break calculations available for subtotals or other calculated values in any break level, as well as any individual row sub-selection from the top.

These values are returned by PrintList Pro without need for actual printing.

PL_ProcessArrays is used to specify the name of the computed break callback function. This function will be called for the break levels and the columns specified by the **breakArrays** and **dataArrays** parameters.

In addition, the **useDetail** parameter allows calling the callback only on breaks, or for each individual row as well.

The Computed Break callback method receives three parameters: a **handle** needed to call ***PL_GetBreakValue***, the current **row** number and the current break level, or -1 if individual rows are set to call the callback with ***PL_ProcessArrays***.

You must use the following declarations in your callback method:

```
C_LONGINT ($1) //handle to pass over to PL_GetBreakValue
C_LONGINT($2) //current row number
C_LONGINT ($3) //break level (or -1 for an individual row)
```

PL_GetBreakValue is called from the callback method to perform usual break level processing calculations such as sum, minimum,etc. for the current break level (or individual row) and the specified column.

See Using Computed Breaks for details.

Field and Record Commands

PrintList Pro uses the **SELECTION RANGE TO ARRAY** command in 4D to get the records for printing.

Up to 32767 fields (columns) can be printed in a PrintList Pro object.

Using the Field Printing Capability

Temporary Arrays

PrintList Pro internally uses interprocess 4D arrays to get the record data from 4th Dimension. These arrays do not have to be declared in 4D.

Arrays and Fields

Arrays and fields may not be printed together in the same PrintList Pro object. If arrays are printed in an object, then the field commands will be ignored. Conversely, if fields are printed in an object, then the array commands will be ignored.

Printing 4D Fields

Fields from Related One Tables

Fields from a main table and from related one tables may be printed in the same PrintList Pro object. See the commands PL_SetFile and PL_SetFields for further information about printing fields from related one tables.

Sorting

PrintList Pro uses 4th Dimension's sorting routines when sorting fields.

When printing records, fields from a related one table can be included in a sort.

Time Data

Time data will be converted to a longint since this is how it is stored internally by 4D.

Maximum Number of Records Printed

The maximum number of PrintList Pro records printed in a PrintList Pro object is only limited by 4D's own limitations and available memory.

Performance Issues When Printing Fields

When PrintList Pro prints fields, the automatic column sizing algorithm uses only the first 20 records (or less, if the selection contains less than 20 records) in the selection. These records are always read regardless of whether the columns are automatically or manually sized.

Therefore there is no performance penalty using the automatic column sizing algorithm when printing fields. See Performance Issues with Formatting Commands for more information.

Commands

PL_SetFile (areaRef:L; tableNum:I) -> resultCode:L

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ tableNum	integer	Number of 4D table
← resultCode	longint	Result code

PL_SetFile tells PrintList Pro what table is the main table from which to print records.

This command is only necessary if the field to be printed in column one is not from the main table, but from a related one table.

PL_SetFile must be called before any fields have been set, otherwise it will be ignored. If this command is not called, then PrintList Pro will use the table of the field printed in column one as the main table.

resultCode — The possible values are:

Constant	*Value*	*Action*
PL SetFile Passed	0	
PL Not enough memory	5	Increase 4D's RAM partition
PL Not a file	6	Check to make sure that the table represented by tableNum does exist
PL Wrong 4D version	10	(obsolete)
PL Arrays have been set	11	You've attempted to set fields or a table when arrays have already been set
PL Fields have been set	12	You've attempted to set arrays when fields have already been set

Example

```
$result:=PL_SetFile(eList;Table(->[People]))
```

PL_SetFields

PL_SetFields (areaRef:L; tableNum:I; columnNumber:I; numFields:I; fieldNum1; …; fieldNumN:I) -> resultCode:L

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ tableNum	integer	Number of 4D table
→ columnNumber	integer	Column at which to set the first field
→ numFields	integer	Number of fields to set (up to 15)
→ fieldNum	integer	Number of 4D field
← resultCode	longint	Result code

PL_SetFields tells PrintList Pro what fields to print. Up to fifteen fields can be set at a time. Any 4D field type can be used.

Fields from related one tables may also be printed (see PL_SetFile). A separate call to ***PL_SetFields*** must be made to set these fields. To print a related one field, pass the table number of the related one table in the **tableNum** parameter.

This command is also used to print calculated columns. See Calculated Columns.

resultCode — The possible values are:

Constant	*Value*	*Action*
PL SetFile Passed	0	
PL Not enough memory	5	Increase 4D's RAM partition
PL Not a file	6	Check to make sure that the table represented by tableNum does exist
PL Not a field	7	The fieldNum passed is not a valid 4D field number
PL Wrong field type	8	The field passed cannot be used by PrintList because the field's type is not supported
PL Maximum fields exceeded	9	32767 fields is the maximum
PL Wrong 4D version	10	(obsolete)
PL Arrays have been set	11	You've attempted to set fields or a table when arrays have already been set

Examples

```
//Set up the eList PrintList Pro object with 5 fields, all from the same table
$error:=PL_SetFields(eList;Table(->[People]);1;5;Field(->[People]First Name);
   Field(->[People]LastName);Field(->[People]Salary);Field(->[People]Arrival);Field(->[People]Male))

//Set up the eList PrintList Pro object with 4 fields, the third one from a related table
$error:=PL_SetFields(eList;Table(->[People]);1;2;Field(->[People]First Name);
   Field(->[People]Last Name))
$error:=PL_SetFields(eList;Table(->[Companies]);3;1;Field(->[Companies]Company Name))
$error: PL_SetFields(eList;Table(->[People]);4;1;Field(->[People]Salary))

//Set up the eList PrintList Pro object with 4 fields, the first one from a related table
$error:=PL_SetFile(eList;Table(->[People])) //set the main table since the field to be set in column
   one is not from the main table, but from a related one table
$error:=PL_SetFields(eList;Table(->[Companies]);1;1;Field(->[Companies]Company Name))
$error:=PL_SetFields(eList;Table(->[People]);2;3;Field(->[People]First Name);
   Field(->[People]Last Name); Field(->[People]Salary))
```

Calculated Columns

PrintList Pro columns can be calculated "on the fly" to print the results of calculations performed in a callback method.

This feature is available for both field and array printing modes.

Setting a Calculated Column (field mode)

The PL_SetFields command is used both to set fields to be printed and to set up calculated columns.

If the **fieldNum** parameter contains an integer greater than or equal to 1, the column will print the field represented by that number.

If the **fieldNum** parameter contains an integer less than or equal to 0, the column will print calculated data. The absolute value of **fieldNum** will determine the type of data to be printed in the column.

The following table shows the data types that may be printed in a calculated column in field mode:

Constant	*Value*
Is Alpha Field	0
Is Real	1
Is Text	2
Is Picture	3
Is Date	4
Is Boolean	6
Is Integer	8
Is LongInt	9
Is Time	11

For example, to print a calculated column of type Real, pass Is Real (-1) in the **fieldNum** parameter.

Setting a Calculated Column (array mode)

The PL_SetCalcCall command is used to set up calculated columns in array mode.

To make a column calculated, create a regular array-based column and then use:

PL_SetCalcCall (area; column; methodName)

The callback parameters are expected to be declared as (**area**:L; **column**:L; **type**:L; **ptr**:W; **first**:L; **count**:L).

This callback method has the same parameters as a column callback in fields mode, but the array is fully sized (by you as developer), you have to fill the requested elements.

The type is the actual array type, not a field type (e.g. Integer Array instead of Is Integer)

The following table shows the data types that may be printed in a calculated column in array mode:

Constant	*Value*
Real array	14
Integer array	15
LongInt array	16
Date array	17
Text array	18
Picture array	19
String array	21
Boolean array	22

Setting the Callback Method

In both field mode and array mode, use the PL_SetCalcCall command to set the Calculated Column Callback for a column.

In field mode, PrintList Pro will dimension the temporary array before invoking the calculated column callback. There is no need to do it in the callback itself.

In array mode, the arrays used to place the calculated values must be declared and sized just as the other displayed arrays.

Field mode example

The following is an example of a calculated callback method in field mode. It merely calculates an employee's one year anniversary by adding one year to their hire date (using the 4D **Add to date** function).

```
//CalcColCallback
//$1: Area reference (PrintList Pro longint reference)
//$2: Column number
//$3: Type of data in this column
//$4: Pointer to temporary 4D array
//$5: First record for which to calculate cell
//$6: Number of cells to calculate in column

//Declare the parameters
C_LONGINT($1;$2;$3;$5;$6) //these must be declared
C_POINTER($4) //this must be declared
C_LONGINT($i)
ARRAY DATE($aHireDate;0) //local array can be used since we only need it here for calculation
SELECTION RANGE TO ARRAY($5;$5+$6-1;[Employee]Hire Date;$aHireDate)
For($i;1;$6)
   $4->{$i}:= Add to date($aHireDate{$i};1;0;0)
End for
```

Array mode example

The following is an example of a calculated callback method in array mode, using the same simple calculation as above, but with 4D arrays being printed.

These arrays have been initially declared and included in the PrintList Pro area with the same command (either PL_SetArraysNam or PL_AddColumn) for both non-calculated and calculated arrays:

```
//Declare the arrays
ARRAY TEXT(aName;0)
ARRAY DATE(aHireDate;0) //not printed, but needed for calculation
SELECTION TO ARRAY([Employee]Name;aName;[Employee]Hire Date;aHireDate)
ARRAY DATE(aAnniversary;Size of array(aName)) //this is our calculated array - must be of same size!

//Arrays to print
$error:= PL_AddColumn(eList;->aName;0) // no need to specify colum number
$error:= PL_AddColumn(eList;->aAnniversary;0)

 //Set calculated callback method for column 2
PL_SetCalcCall(eList;2;"CalcColCallbackArray")
```

Now we use the callback as previously to populate the array on the fly:

```
 //CalcColCallbackArray
 //$1: Area reference (PrintList Pro longint reference)
 //$2: Column number
 //$3: Type of array in this column
 //$4: Pointer to the printed array
 //$5: First row for which to calculate cell
 //$6: Number of cells to calculate in column

 //Declare the parameters
C_LONGINT($1;$2;$3;$5;$6) //these must be declared
C_POINTER($4) //this must be declared
C_LONGINT($i)

For($i;$5;$5+$6-1)
   $4->{$i}:= Add to date(aHireDate{$i};1;0;0)
End for
```

Commands

PL_SetCalcCall (areaRef:L; columnNumber:I; calcCallback:S)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ columnNumber	integer	Column number
→ calcCallback	string	4D method called ot fill row(s) of a calculated column

PL_SetCalcCall is used to set a callback method for a calculated column.

columnNumber — This parameter specifies the column on which to attach the **calcCallback** method.

calcCallback — This method will be called whenever row(s) need to be filled in a calculated column. If this is an empty string then no method will be called.

The first two parameters ($1 and $2) passed to this callback method are **areaRef** and **columnNumber**. Therefore, if desired, the same callback can be used for more than one PrintList Pro object and for many columns in an object.

For information on how to write a calculated column callback, see the section Calculated Column Callback.

Example

```
//Set calculated callback method for column 3
PL_SetCalcCall(eArea;3;"CalcColCallback")
```

Break Level Processing

About PrintList Pro Break Level Processing

The PrintList Pro break level processing routines provide the functionality of 4D's Quick Report capabilities, and much more. You can choose to display a variety of information for any break level and any column within that break including: static text, Quick Report calculations, custom calculations or break data insertion for each break.

Each piece of information can be shown in different fonts, sizes and styles as well as different colors. You can also control the display of repeated values.

When Do Breaks Occur?

When a list is sorted, often some of the sorted array elements will have groups of identical values.

For example, if the membership of a club that consisted of members from many different countries was sorted by country, the membership list would likely consist of many members that were from the same country. Because the list is sorted, all the members from the same country would be grouped together in the list. A "break" would occur in the list anytime the group changes (the country is different).

Multiple break levels occur when the list is sorted on multiple criteria. The number of any break level is determined by its position in the sort order. If the same membership list is sorted by country first and then by city, a break for break level one (country) would occur whenever the country changes in the list, and a break for break level two (city) would occur whenever the city changes in the list.

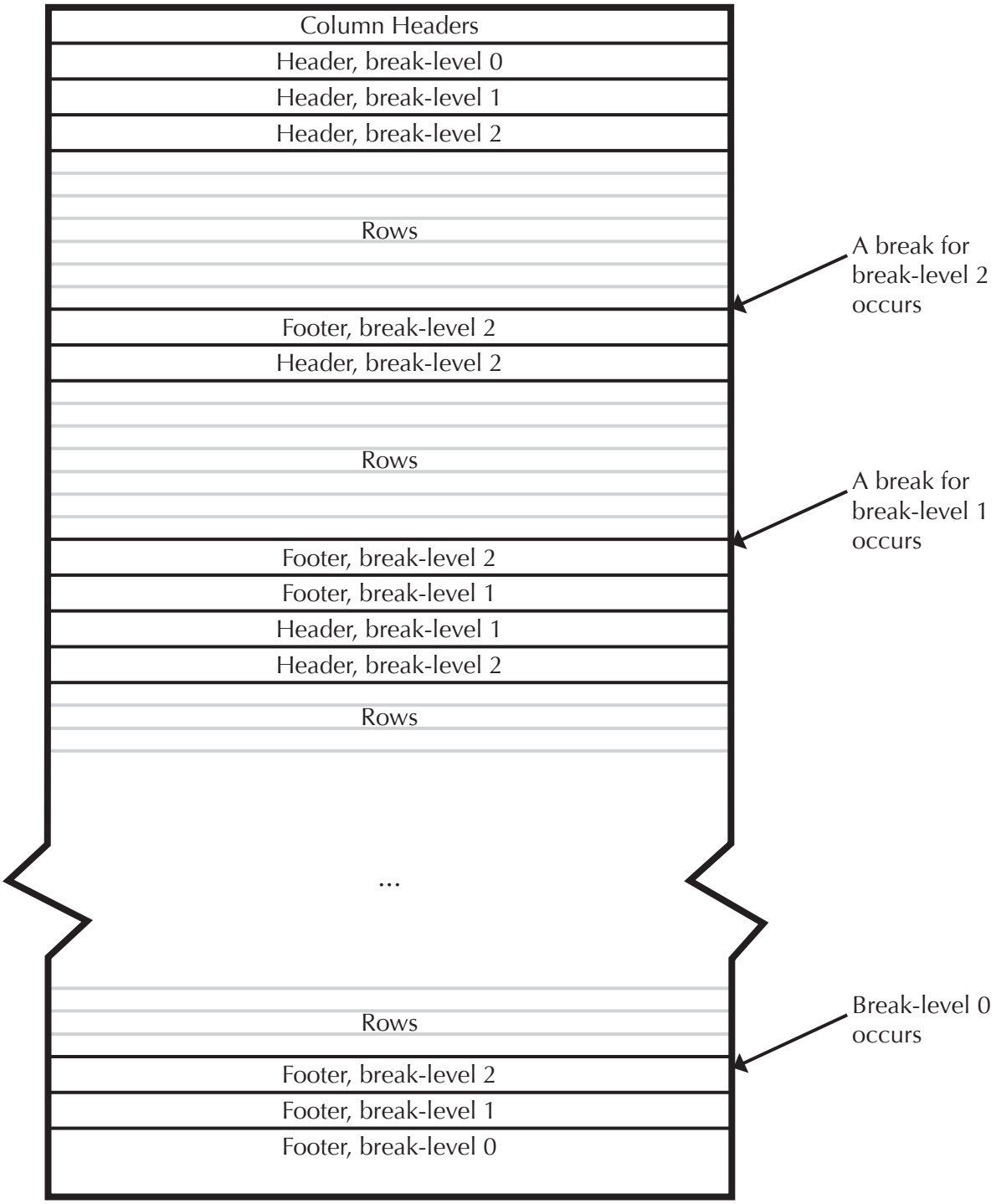
When a break occurs for a certain level, every break level higher than it will occur as well. In the club example, break level 2 (city) will always break whenever a break for break level 1 (country) occurs.

You may want to show leading or summary information for the groups of information within the list. In PrintList Pro, these areas are called break headers and break footers respectively.

A break header will print information just prior to the group of related values while a break footer will print information immediately after the group.

When Do Breaks Occur?

The following is an illustration of the location of break headers and footers within a list:



Using PrintList Pro Break Level Processing

Any break level routine that accepts a column number requires that the column/array be set using PL_SetArraysNam or PL_AddColumn prior to calling that routine.

PrintList Pro provides up to 15 break levels and a total line at the end of list. For any given list, the number of break levels can be no greater than the number of sorted arrays.

PrintList Pro will only print a break for a break level that has been configured using PL_SetBrkText for break footers or PL_SetBkHText for break headers.

A break level can be configured regardless if lower breaks have been configured. This is different than 4D's Quick Report Editor that requires the users to "stack" break levels upon lower (closer to 0) break levels and hide the break levels that are not desired.

With PrintList Pro, a break level can be configured regardless if lower breaks have been configured; therefore, there is no need to "hide" a break. In the people example, information can be shown for a group of people in the same city without necessarily showing any information for the state.

In conjunction with ***PL_SetArraysNam***, PrintList Pro uses the information in PL_SetSort to determine where the breaks occur within the arrays. If the arrays passed to PrintList Pro are pre-sorted, PL_SetBrkOrder should be used to notify PrintList Pro of the sort order without forcing an unnecessary sort.

The break level parameter used in many break level routines is the position of a particular column within the sort order given. For example, if a list of people were to be sorted by state, county, and city respectively, the calls to set and sort the arrays would be:

PL_SetArraysNam (eList;1;4;aPeople;aCity;aCounty;aState)
PL_SetSort (eList;4;3;2)

Break level 1 is state (column 4), break level 2 is county (column 3), and break level 3 is city (column 2).

The following commands are used to configure breaks: PL_SetBrkColOpt, PL_SetBrkColRGBOpt, PL_SetBrkColor, PL_SetBrkRGBColor, PL_SetBrkFunc, PL_SetBrkHeight, PL_SetBrkStyle, PL_SetBrkText.

The following commands are used to configure break headers: PL_SetBkHColOpt, PL_SetBkHColRGBOpt, PL_SetBkHColor, PL_SetBkHRGBColor, PL_SetBkHFunc, PL_SetBkHHeight, PL_SetBkHStyle, PL_SetBkHText.

PL_SetBrkRowDiv and PL_SetBrkRowRGBDiv are not specifically break footer or header routines. These commands specify the line that are drawn between a break footer and the following break header or group of rows.

Setting a Break Level

To show information for a break level, you will need to use PL_SetBrkText for break footers and PL_SetBkHText for break headers.

A text variable containing the information to be printed is passed in for a particular cell within the break. Because a break can consist of more than one text line, the supplied text may wrap into several lines. See Multiple Lines in a Break and Variable Height Breaks for more information. Carriage returns may be embedded into the text to force wrapping.

Text Overflow and Justification in Breaks

Unlike a Quick Report, information to be printed in a cell can overflow into adjacent columns depending on the justification.

As specified in the call to ***PL_SetBrkText*** or ***PL_SetBkHText*** , the area used to print the text is taken from the column specified and adjacent columns to the right for left justification, columns to the left for right justification, and columns on both sides for center justification.

Built-in Calculations in a Break

Calculations may be embedded into the text passed to ***PL_SetBrkText*** or ***PL_SetBkHText***.

Built-in functions — sum, minimum, average, maximum, count, variance, standard deviation and break value — can be inserted into the text at any desired location. These are identical to 4D's QuickReport calculations except for break value which inserts the value from the array that caused the break.

Custom Calculations in a Break

You may create custom calculations to be used with or instead of the built-in calculations.

When PrintList Pro sees the custom calculation delimiter, it will execute a callback method, specified using PL_SetBrkFunc for break footers and PL_SetBkHFunc for break headers, that performs the custom calculation.

The callback method may use most 4D commands, but should not call any PrintList Pro commands or any 4D commands that affect the arrays.

Also, the callback method should preserve the current selection of the printing layout's file by saving and restoring the selection if necessary. The value returned by the callback method will then be printed at the embedded position within the break text.

Suppressing Repeated Values in the List

Repeated values in a sorted list can be suppressed using PL_SetRepeatVal. The repeated value is shown on the first occurrence and at the top of each page thereafter.

PL_SetRepeatVal works on any sorted list regardless of whether any break level information is shown or not.

Style and Color in Breaks

Style and color settings can be provided for each column within each break level using:

PL_SetBrkColor for break footers and PL_SetBkHColor for break headers to set foreground and background colors using PrintList Pro's palette or 4D's palette.

PL_SetBrkRGBColor for break footers and PL_SetBkHRGBColor for break headers to set foreground and background colors using standard RGB values.

PL_SetBrkStyle for break footers and PL_SetBkHStyle for break headers to set text style settings

If no style or color information is given, PrintList Pro will use the corresponding column settings from the list.

Multiple Lines in a Break

Both break headers and footers can be configured to be a fixed number of lines per break or a variable number of lines.

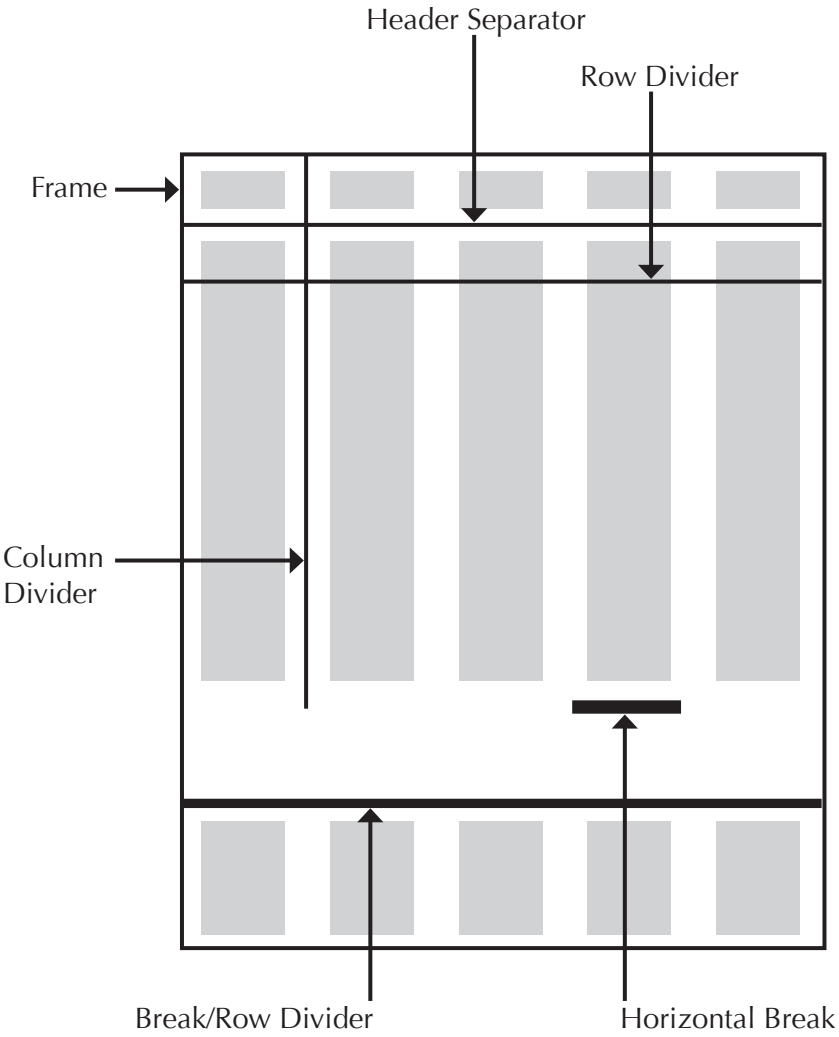
To set the number of lines to be printed in a break level, use PL_SetBrkHeight for break footers and PL_SetBkHHeight for break headers.

Please read the section Variable Height Breaks for more information.

If no calls to PL_SetBrkText are made for a specific break level, nothing will be displayed for any break occurring for that level regardless of the number of lines or height pad specified in ***PL_SetBrkHeight***.

Lines Displayed in a Break

PrintList Pro provides complete control over all the lines printed in a break as shown in the following illustration:



Whenever a break or group of breaks is printed, the line following the last break, referred to as the Break/Row Divider, can be configured using PL_SetBrkRowDiv or PL_SetBrkRowRGBDiv. If the Break/Row divider is not set, the row divider (if set) will be printed by default.

If column dividers have been set using PL_SetDividers or PL_SetRGBDividers, they can be printed in the break using PL_SetBrkColOpt/PL_SetBrkColRGBOpt for break footers and PL_SetBkHColOpt/PL_SetBkHColRGBOpt for break headers.

If set, the column divider will be printed in the break area to the right of each column within the break level.

A horizontal line, referred to in the illustration on the previous page as the Horizontal Break line, may be printed within the break areas as well.

- for break footers, use PL_SetBrkColOpt/PL_SetBrkColRGBOpt to print a line at the top of the cell within the break footer area
- for break headers, use PL_SetBkHColOpt/PL_SetBkHColRGBOpt to print a line at the bottom of the cell within the break header area

Hide the Detail Area

The detail area (the list of array data) can be hidden to show only the break level information on the page using ***PL_SetColOpts***. This is ideal for giving a summary of the array information.

Page Breaks

PL_SetPageBreak tells PrintList Pro whether or not to force a page break on any given break level.

The page break will occur immediately after the break footer is printed for that break level. However, a page break can be set for a break level regardless of whether a break level is configured to print a break footer.

PL_SetBrkOpts can be called with the parameter **printLastPageBreak** to print or suppress a a page break if it occurs on the last page. This option is used to avoid the printing of an unneeded blank page at the end of a PrintList Pro report.

Variable Height Breaks

Any given break level can be set to be a variable height. The same rules apply to breaks as to the rows in that a break can be of no height or up to the height of an entire page.

When a break level is set to be variable height, PrintList Pro will perform the necessary break level calculation(s) to determine the height of the text that is to be printed in the break.

To set a break level to be variable height use PL_SetBrkHeight for break footers and PL_SetBkHHeight for break headers.

Using Break Headers

The ability to configure break headers is identical to that of break footers including:

- all calculations: sum, min, average, max, count, variance, standard deviation and break value
- a callback for the break function (one callback for all break headers)
- full style (font, size, style) control for each cell within the break
- horizontal and vertical line/divider control
- foreground and background colors for each cell within the break
- variable height breaks

Break headers can be configured using six commands: PL_SetBkHText, PL_SetBkHFunc, PL_SetBkHStyle, PL_SetBkHColor/PL_SetBkHRGBColor, PL_SetBkHHeight, and PL_SetBkHColOpt/PL_SetBkHColRGBOpt. These commands are identical in syntax to the break footer commands.

PL_SetBrkColOpt/PL_SetBrkColRGBOpt can be called to print horizontal lines at the top of a cell with a break footer. With break headers, the equivalent commands ***PL_SetBkHColOpt***/***PL_SetBkHColRGBOpt*** will print lines at the bottom of a cell within the break header.

Just as with break footers, break headers will only be printed if the command to set the break text, ***PL_SetBkHText***, has been called for a particular break level.

Break headers can be configured to be fixed or variable height and have full background color control as is now available with break footers.

Using Computed Breaks

These powerful commands can be used as array utilities without need to print anything or set up a plug-in area.

PL_ProcessArrays is used to specify the name of the computed break callback function. This function will be called for the break levels and the columns specified by the **breakArrays** and **dataArrays** parameters (pointers to arrays).

In addition, the **useDetail** parameter allows calling the callback only on breaks (value 0), or for each individual row as well (value 1).

PL_ProcessArrays operates on a copy of the arrays, you can freely modify them in the callback.

The callback method is called by PrintList Pro as:

callbackMethodName (**handle**:L; **row**:L; **breakLevel**:L)

PL_GetBreakValue can only be called from the callback method with the specified **handle** that was received.

This command performs any break level processing **calculation** (sum, minimum, average, maximum, count, variance, standard deviation) for the current break level (or individual row) and the specified **column** (from the list previously defined by the **dataArrays** parameter).

See Example 5 — Computed Breaks.

Commands

PL_SetPageBreak (areaRef:L; breakLevel:I; insertPageBreak:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ breakLevel	integer	Break level number
→ insertPageBreak	integer	Insert a page break after the break level

PL_SetPageBreak is used to set a page break after each break at the specified break level.

A page break can be inserted provided the rows are sorted. However, it is not necessary to configure a break level using PL_SetBrkText or PL_SetBkHText in order to insert a page break.

For the specified break level, the break header, the rows, and the break footer will print (if so configured) prior to the page break. Any subsequent break footers or rows will be printed at the top of the following page.

breakLevel — The position in the sort order specified in PL_SetSort or PL_SetBrkOrder i.e. 1 through n, where n is the number of levels of sort.

insertPageBreak — 0 or 1:

- 0 — no page break will be inserted (default)
- 1 — a page break will be inserted after each break at the specified break level

Refer to PL_SetBrkOpts to see how to print or suppress a page break on the last page of a PrintList report.

Example

```
PL_SetPageBreak(eList;1;1) //force a page break after printing each break of break level 1
```

PL_SetBrkOpts (areaRef:L;printLastPageBreak:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ printLastPageBreak	integer	Print a page break on the last page

PL_SetBrkOpts is used to set options pertaining to break levels.

printLastPageBreak — 0 or 1:

- 0 — the page break will be suppressed (default)
- 1 — if there is a page break on the last page, it will be printed

Refer to PL_SetPageBreak for configuring page breaks.

Example

```
PL_SetBrkOpts(eList;0) //don't print the last page break
```

PL_SetBrkOrder (areaRef:L; columnNum1:I; …; columnNumN:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ columnNum1; …; columnNumN	integer	Column(s) that reflects the sort order

PL_SetBrkOrder is used to communicate the sort order of a previously sorted list to PrintList Pro. The sort information is used by PrintList Pro to determine where breaks occur within the sorted list.

The syntax of this call is identical to that of PL_SetSort.

columnNum — A value greater than 0 indicates that an ascending sort was performed upon that column, while a value less than 0 indicates a descending sort. If a **columnNum** is 0 then all successive columns will be ignored.

PL_SetBrkOrder does not perform a sort.

Examples

```
PL_SetBrkOrder(eContacts;3;4;7) //was sorted on columns 3, 4, and 7 (all ascending)
PL_SetBrkOrder(eContacts;-1;3;-2) //was sorted on columns 1 descending, 3 ascending, 2 descending
```

PL_SetRepeatVal (areaRef:L; columnNum:I; repeatValues:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ columnNum	integer	Column number
→ repeatValues	integer	Hide/print repeated values for this column

PL_SetRepeatVal is used to control the printing of repeated values within a sorted column.

Use PL_SetSort to sort the arrays or if already sorted, use PL_SetBrkOrder to communicate the sorted order to PrintList Pro.

columnNum — The column number to apply this command to. Use a value of zero (0) to apply the repeat settings to all columns in the list.

repeatValues — 0 or 1:

- 0 — print all repeated values (default)
- 1 — only print the first occurence of a repeated value after reaching a break and at the top of each page thereafter

Examples

PL_SetRepeatVal(eList;3;0) //show repeat values for column 3

PL_SetRepeatVal(eList;0;1) //hide repeat values for all columns

---

PL_SetBrkText (areaRef:L; breakLevel:I; columnNum:I; breakText:T; numColsToOverflow:I; justification:I)

Prameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ breakLevel	integer	Break level number
→ columnNum	integer	Column number
→ breakText	integer	Text to be printed when a break occurs
→ numColsToOverflow	integer	Number of adjacent columns to overflow into
→ justification	integer	Justification of the break text

PL_SetBrkText is used to specify the text, passed in as **breakText**, to be printed in the **breakLevel** and **columnNum** specified.

Calculations can be performed upon the corresponding values in the list. A calculation is performed by embedding a special calculation string(s) into **breakText** as described below.

Text can overflow to adjacent columns using the **numColsToOverflow** parameter. The text is justified within a column(s) using the justification parameter.

If no call to ***PL_SetBrkText*** is made for **breakLevel**, no break information will be printed for that break level.

breakLevel — The position in the sort order specified in PL_SetSort or PL_SetBrkOrder — i.e., 1 through n, where n is the number of levels of sort. Use a value of 0 to specify the total line to be printed at the end of the list.

columnNum — The column number at which the specified text will be placed for the specified **breakLevel**.

breakText — The text to be shown in **columnNum** whenever a break occurs for **breakLevel**. The text may automatically wrap to multiple lines or carriage returns can be embedded to force text wrapping. Use PL_SetBrkHeight or PL_SetBkHHeight to set the number of text lines for a break level if more than 1 line is anticipated.

A calculation may be performed on all the values in **columnNum** since the last break for **breakLevel**.

breakText can include embedded calculation strings which inform PrintList Pro to perform the desired calculation using the array values associated with **columnNum**. The result of the calculation is formatted into a string which replaces the calculation string at its location within **breakText**. The following table shows a list of the calculations and the associated strings (not case-sensitive) that can be included in **breakText**:

Calculation	*Calculation String*
Sum	"\Sum"
Minimum	"\Minimum"
Average	"\Average"
Maximum	"\Maximum"
Count	"\Count"
Variance	"\Var"
Standard deviation	"\Dev"
Break Value Insertion	"\BreakValue"

Sum, Minimum, Average, Maximum, Count and Standard deviation are identical to that of 4D's QuickReport editor.

Break Value Insertion will use the array value from the sorted column that is associated with **breakLevel** for insertion into **breakText**.

Custom Calculation will execute the callback function specified in ***PL_SetBrkFunc*** or ***PL_SetBkHFunc*** to retrieve a string for insertion into **breakText**. See PL_SetBrkFunc and PL_SetBkHFunc for details of performing custom calculations using the callback function.

Not all calculations are available on all array types. The following table lists the possible calculations for the various array data types and the resulting type of the calculation:

Column Data Type	*Calculation*	*Data Type of Result*
numeric	Sum	same as column
numeric	Minimum	same as column
numeric	Average	real
numeric	Maximum	same as column
all	Count	integer
numeric	Variance	same as column
numeric	Standard deviation	same as column
all	Break Value Insertion	same as break column
all	Custom Calculation	formatted text

When the resulting value's data type is the same as the **columnNum** data type, the value is formatted using the column's format. Otherwise, the calculations' results will use PrintList Pro's real and integer default formats where appropriate.

The result of the custom calculation is formatted by the callback function which returns text.

numColsToOverflow — Number of adjacent columns to use when overflowing to the right (when left justified), or left (when right justified), or both (when center justified) of **columnNum**. A value of zero, which is the default, indicates that **breakText** will only be printed within the column.

justification — The justification of **breakText** within the column (or columns if **numColsToOverflow** is greater than 0):

- 0 — default (justification of **columnNum** in the list detail area will be used)
- 1 — left
- 2 — center
- 3 — right

Examples

```
//Break level 1, column 3, overflow 2 columns to the right, left-justified
PL_SetBrkText(eList;1;3;"Company Subtotals";2;1)

//Break level 3, column 6, no column overflow, use default justification
PL_SetBrkText(eList;3;6;"\Sum";0;0)

//Break level 4, column 3, overflow into 1 column on both sides of this column, center-justified
PL_SetBrkText(eList;4;3;"There are \Count people in this department.";1;2)
```

PL_SetBkHText (areaRef:L; breakLevel:I; columnNum:I; breakText:T; numColsToOverflow:I; justification:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ breakLevel	integer	Break level number
→ columnNum	integer	Column number
→ breakText	integer	Text to be printed when a break occurs
→ numColsToOverflow	integer	Number of adjacent columns to overflow into
→ justification	integer	Justification of the break text

PL_SetBkHText is used to specify the text that is to be printed in the break header. The syntax of this command is identical to that of PL_SetBrkText.

PL_SetBrkFunc (areaRef:L; functionName:S)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ functionName	string	Function name to be called back

PL_SetBrkFunc is used to specify the callback function for use with custom calculations. The callback function **functionName** is called whenever PrintList Pro encounters the string "\Function" within the text that is to be printed for a specific break level.

Refer to PL_SetBrkText for details on how to embed the custom calculation string.

PrintList Pro passes information needed for the custom calculation to the callback function.

The callback function should be created using the following interface:

```
//Function: MyBreakFunction (breakLevel; column; colFormat; startRow; endRow)
C_INTEGER ($1;$2) //break level, column
C_STRING (82;$3) //column format
C_LONGINT($4;$5) //start row, end row
C_TEXT ($0) //custom calculation result to print
//... perform the custom calculation
$0:=String(customCalc;$3) //format the string using the column format
```

The callback function is passed the break level number for which the break has occurred, the column number, the format of that column, and the starting and ending indexes of the corresponding array.

The function should return, as formatted text, the result of the calculation. The return variable, $0, should be of type text and should be 255 characters or less.

Example

```
PL_SetBrkFunc(eList;"Break Function") //custom calculation callback
```

See Example 4 - Break Level Processing for an example of a custom calculation callback function.

PL_SetBkHFunc (areaRef:L; functionName:S)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ functionName	string	Function name to be called back

PL_SetBkHFunc is used to specify the name of the break header callback function. This function will be called for any break header that contains a break function.

Refer to PL_SetBrkText and PL_SetBkHText to determine how to set a break function for a break level.

The syntax of this command is identical to that of PL_SetBrkFunc.

PL_SetBrkStyle (areaRef:L; breakLevel:I; columnNum:I; fontName:S; size:I; styleNum:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ breakLevel	integer	Break level number
→ columnNum	integer	Column number
→ fontName	string	Name of the font
→ size	integer	Size of the font
→ styleNum	integer	Style of the font

PL_SetBrkStyle is used to control the appearance of the break level text for the **breakLevel** and **columnNum** specified. The columns can be controlled individually or as a group.

breakLevel — This parameter specifies the break level to apply this command to.

columnNum — The column to apply this command to. Use a value of zero (0) to apply the parameters to all columns within that break level.

fontName — This specifies the font for the break. The break font may be left unchanged by setting **fontName** to the empty string (""). If the font specified is not found, it will be treated as an empty string and ignored.

fontSize — This specifies the font size for the break. The break font size may be left unchanged by setting **fontSize** to 0.

styleNum — This parameter is a font style code. By adding the codes together, you can combine styles. The numeric codes for **styleNum** are shown below.

Style	*Number*
Plain	0
Bold	1
Italic	2
Underline	4
Outline	8
Shadow	16
Condensed	32
Extended	64

PL_SetBkHStyle (areaRef:L; breakLevel:I; columnNum:I; fontName:S; size:I; styleNum:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ breakLevel	integer	Break level number
→ columnNum	integer	Column number
→ fontName	string	Name of the font
→ size	integer	Size of the font
→ styleNum	integer	Style of the font

PL_SetBkHStyle is used to set the style of the text that is to be printed in the break header.

The syntax of this command is identical to that of PL_SetBrkStyle.

PL_SetBrkColor (areaRef:L; breakLevel:I; columnNum:I; plpForeColor:S; 4dForeColor:I; plpBackColor:S; 4dBackColor:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ breakLevel	integer	Break level number
→ columnNum	integer	Column number
→ plpForeColor	string	Foreground color from PrintList Pro's palette
→ 4dForeColor	integer	Foreground color from 4D's palette
→ plpBackColor	string	Background color from PrintList Pro's palette
→ 4dBackColor	integer	Background color from 4D's palette

PL_SetBrkColor is used to specify the color of the text to be printed in the specified **columnNum** and **breakLevel**.

PrintList Pro has its own palette, with the following colors: white, black, blue, green, yellow, magenta, red, cyan, gray, light gray. Color constants can be used.

breakLevel — This parameter specifies the break level to apply this command to.

columnNum — The column to apply this command to. Use a value of zero (0) to apply the colors to all columns within that break level.

plpForeColor — Name of the color in PrintList Pro's palette. This will be the foreground color for the break. If the name is not in PrintList Pro's palette or it is the empty string (""), then **4dForeColor** will be used.

4dForeColor — 1 to 256. Foreground color number for the break (from 4D's palette). If a break foreground color has been previously set, it may be removed by setting **plpForeColor** to the empty string (""), and **4dForeColor** to 1. The break foreground color may be left unchanged by setting **plpForeColor** to the empty string (""), and **4dForeColor** to 0.

plpBackColor — Name of the color in PrintList Pro's palette. This will be the background color for the break. If the name is not in PrintList Pro's palette or it is the empty string (""), then **4dBackColor** will be used.

4dBackColor — 1 to 256. Background color number for the break (from 4D's palette). If a break background color has been previously set, it may be removed by setting **plpBackColor** to the empty string (""), and **4dBackColor** to 1. The break background color may be left unchanged by setting **plpBackColor** to the empty string (""), and **4dBackColor** to 0.

Examples

```
//Set the foreground color for the break in column 3, break level 1, to red - no background color
PL_SetBrkColor(eList;1;3;"red";0;"";0)
//Set the background color for the break in column 3, break level 1, to blue - no foreground color
PL_SetBrkColor(eList;1;3;"";0;"Blue";0)
```

PL_SetBrkRGBColor (areaRef:L; breakLevel:I; columnNum:I; breakForeRed:L; breakForeGreen:L; breakForeBlue:L; breakBackRed:L; breakBackGreen:L; breakBackBlue:L)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ breakLevel	integer	Break level number
→ columnNum	integer	Column number
→ breakForeRed	longint	Foreground red
→ breakForeGreen	longint	Foreground green
→ breakForeBlue	longint	Foreground blue
→ breakBackRed	longint	Background red
→ breakBackGreen	longint	Background green
→ breakBackBlue	longint	Background blue

PL_SetBrkRGBColor is used to specify the color of the text to be printed in the specified **columnNum** and **breakLevel**.

This routine works in the same manner as PL_SetBrkColor, except it allows you to specify the colors using standard RGB values.

PL_SetBkHColor

PL_SetBkHColor (areaRef:L; breakLevel:I; columnNum:I; plpForeColor:S; 4dForeColor:I; plpBackColor:S; 4dBackColor:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ breakLevel	integer	Break level number
→ columnNum	integer	Column number
→ plpForeColor	string	Foreground color from PrintList Pro's palette
→ 4dForeColor	integer	Foreground color from 4D's palette
→ plpBackColor	string	Background color from PrintList Pro's palette
→ 4dBackColor	integer	Background color from 4D's palette

PL_SetBkHColor is used to specify the color of the text to be printed in the break header for the specified **columnNum** and **breakLevel**.

PrintList Pro has its own palette, with the following colors: white, black, blue, green, yellow, magenta, red, cyan, gray, light gray. Color constants can be used.

breakLevel — This parameter specifies the break level to apply this command to.

columnNum — The column to apply this command to. Use a value of zero (0) to apply the colors to all columns within that break level.

plpForeColor — Name of the color in PrintList Pro's palette. This will be the foreground color for the break. If the name is not in PrintList Pro's palette or it is the empty string (""), then **4dForeColor** will be used.

4dForeColor — 1 to 256. Foreground color number for the break header (from 4D's palette). If a break header foreground color has been previously set, it may be removed by setting **plpForeColor** to the empty string (""), and **4dForeColor** to 1. The break header foreground color may be left unchanged by setting **plpForeColor** to the empty string (""), and **4dForeColor** to 0.

plpBackColor — Name of the color in PrintList Pro's palette. This will be the background color for the break header. If the name is not in PrintList Pro's palette or it is the empty string (""), then **4dBackColor** will be used.

4dBackColor — 1 to 256. Background color number for the break header (from 4D's palette). If a break header background color has been previously set, it may be removed by setting **plpBackColor** to the empty string (""), and **4dBackColor** to 1. The break header background color may be left unchanged by setting **plpBackColor** to the empty string (""), and **4dBackColor** to 0.

Examples

```
//Set the foreground color for the break header in column 3, break level 1, to red - no background color
PL_SetBkHColor(eList;1;3;"red";0;"";0)
//Set the background color for the break header in column 3, break level 1, to blue - no foreground color
PL_SetBrkColor(eList;1;3;"";0;"Blue";0)
```

PL_SetBkHRGBColor (areaRef:L; breakLevel:I; columnNum:I; brkHdrForeRed:L; brkHdrForeGreen:L; brkHdrForeBlue:L; brkHdrBackRed:L; brkHdrBackGreen:L; brkHdrBackBlue:L)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ breakLevel	integer	Break level number
→ columnNum	integer	Column number
→ brkHdrForeRed	longint	Foreground red
→ brkHdrForeGreen	longint	Foreground green
→ brkHdrForeBlue	longint	Foreground blue
→ brkHdrBackRed	longint	Background red
→ brkHdrBackGreen	longint	Background green
→ brkHdrBackBlue	longint	Background blue

PL_SetBkHRGBColor is used to specify the color of the text to be printed in the break header for the specified **columnNum** and **breakLevel**.

This routine works in the same manner as PL_SetBkHColor, except it allows you to specify the colors using standard RGB values.

PL_SetBrkHeight (areaRef:L; breakLevel:I; numBreakLines:I; breakHeightPad:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ breakLevel	integer	Break level number
→ numBreakLines	integer	Number of text lines in the break
→ breakHeightPad	integer	Extra height for the break

PL_SetBrkHeight is used to set the number of lines of text along with additional height pad for **breakLevel**. If no calls to PL_SetBrkText are made for **breakLevel**, nothing will be displayed for any break occurring for that level regardless of the number of lines or height pad specified in ***PL_SetBkHeight***.

numBreakLines — The number of lines to give to each break of the specified break level. A value greater than 0 means that the height of each break is the same. The fixed height will be a function of the number of text lines specified. A value of zero means that the height of each break is to be calculated automatically based on the data that is to be printed. Default is 1.

breakHeightPad — The extra height to give to the break level. An additional padding may be set using **breakHeightPad** to allow more space around the break. Text will be centered vertically within the break. Default is 0.

The padding applies to the entire break and not on a line by line basis within the break.

Examples

```
//Allocate 5 lines and no pad for break level 3
PL_SetBrkHeight(eList;3;5;0)
//Break level 2, Pad by 4 pixels, only 1 line
PL_SetBrkColor(eList;2;1;4)
```

PL_SetBkHHeight (areaRef:L; breakLevel:I; numBreakLines:I; breakHeightPad:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ breakLevel	integer	Break level number
→ numBreakLines	integer	Number of text lines in the break
→ breakHeightPad	integer	Extra height for the break

PL_SetBkHHeight is used to set the number of lines of text along with additional height pad for the specified break header level.

The syntax of this command is identical to that of PL_SetBrkHeight.

numBreakLines — The number of lines to give to each break of the specified break level. A value greater than 0 means that the height of each break is the same. The fixed height will be a function of the number of text lines specified. A value of zero means that the height of each break is to be calculated automatically based on the data that is to be printed. Default is 1.

breakHeightPad — The extra height to give to the break level. An additional padding may be set using **breakHeightPad** to allow more space around the break. Text will be centered vertically within the break. Default is 0.

The padding applies to the entire break and not on a line by line basis within the break.

PL_SetBrkRowDiv (areaRef:L; lineWidth:F; pattern:S; plpColor:S; 4dColor:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ lineWidth	real	Width of the break/row divider line
→ pattern	string	Pattern of the line
→ plpColor	string	Color from PrintList Pro's palette for the line
→ 4dColor	integer	Color from 4D's palette for the line

PL_SetBrkRowDiv is used to set the line width, pattern (transparency ratio) and color of the break/row divider line which is drawn between any/all break level information and the rows of list data (detail area) that immediately follow.

PrintList Pro has its own palette, with the following colors: white, black, blue, green, yellow, magenta, red, cyan, gray, light gray. Color constants can be used.

lineWidth — 0 to 1. This option controls the line width of the break/row divider line. A value of 0.25 pixels should be used for hairlines. A value of 0 means that no line will be printed.

pattern — Name of the pattern (transparency ratio) for the break/row divider line. If a null string is used then no line will be printed. These are the available patterns: white, black, gray, light gray, and dark gray. See the Patterns item in the Compatibility Notes.

plpColor — Name of the color in PrintList Pro's palette. This will be the color for the break/row divider line. If the name is not in PrintList Pro's palette or it is a null string, then **4dColor** will be used.

4dColor — 1 to 256. The color at this position in 4D's palette will be used for the break/row divider line.

If ***PL_SetBrkRowDiv*** is not called, then the settings for the detail area row dividers, if any, will be used.

Examples

```
//Print 1 pixel wide, solid Red break/row divider line
PL_SetBrkRowDiv(eList;1;"Black";"Red";0)
//Print hairline width, solid gray break/row divider line
PL_SetBrkRowDiv(eList;0.25;"Black";"Gray";0)
```

PL_SetBrkRowRGBDiv (areaRef:L; lineWidth:F; dividerRed:L; dividerGreen:L; dividerBlue:L)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ lineWidth	real	Width of the break/row divider line
→ dividerRed	longint	Divider line — Red
→ dividerGreen	longint	Divider line — Green
→ dividerBlue	longint	Divider line — Blue

PL_SetBrkRowRGBDiv is used to set the line width and color of the break/row divider line which is drawn between any/all break level information and the rows of list data (detail area) that immediately follow.

This routine works in the same manner as PL_SetBrkRowDiv, except it allows you to specify the colors using standard RGB values.

PL_SetBrkColOpt (areaRef:L; breakLevel:I; columnNum:I; showColDivider:I; lineWidth:F; pattern:S; plpColor:S; 4dColor:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ breakLevel	integer	Break level number
→ columnNum	integer	Number of column
→ showColDivider	integer	Show column divider, if any, in the break
→ lineWidth	real	Width of the horizontal break line
→ pattern	string	Pattern of the horizontal break line
→ plpColor	string	Color from PrintList Pro's palette for the horizontal break line
→ 4dColor	integer	Color from 4D's palette for the horizontal break line

PL_SetBrkColOpt is used to control the printing of column dividers and horizontal lines within the **breakLevel** for each **columnNum** and to print a horizontal line within a column for this break level.

If **showColDivider** is 1, a column divider will be printed along the right side of the column specified. The line characteristics are identical to the column divider shown in the list (detail area).

PL_SetBrkColOpt may be called to show a horizontal line at the top of the break specified in **breakLevel** in the column specified by **columnNum**. This horizontal line could be used as a subtotal line to separate a column of values from a sum or average that is calculated in the break.

If ***PL_SetBrkColOpt*** is not called for any columns in a given break level, then no column dividers or horizontal break lines will be printed for that break level.

PrintList Pro has its own palette, with the following colors: white, black, blue, green, yellow, magenta, red, cyan, gray, light gray. Color constants can be used.

showColDivider — 0 or 1:

- 0 — don't show a column divider (default)
- 1 — show the column divider along the right side of the column specified in the **columnNum** parameter whenever a break for the break level specified in **breakLevel** occurs

lineWidth — 0 to 1. This option controls the line width of the horizontal break line. A value of 0.25 pixels should be used for hairlines. A value of 0 means that no line will be printed. Double lines (typical in accounting) are supported in breaks: just use 2.0 as the **lineWidth**: two 0.25 point lines will be printed.

pattern — Name of the pattern (transparency ratio) for the horizontal break line. If a null string is used then no line will be printed. These are the available patterns: white, black, gray, light gray, and dark gray. See the Patterns item in the Compatibility Notes.

plpColor — Name of the color in PrintList Pro's palette. This will be the color for the horizontal break line. If the name is not in PrintList Pro's palette or it is a null string, then **4dColor** will be used.

4dColor — 1 to 256. The color at this position in 4D's palette will be used for the horizontal break line.

Examples

```
//Break level 2, column 3, print column divider and a hairline wide, solid Blue horizontal line in column
PL_SetBrkColOpt(eList;2;3;1;0.25;"Black";"Blue";0)
//Break level 4, print the column dividers in all columns, no horizontal break lines
PL_SetBrkColOpt(eList;4;0;1;0;"";"";0)
```

PL_SetBrkColRGBOpt - PL_SetBkHColOpt

PL_SetBrkColRGBOpt (areaRef:L; breakLevel:I; columnNum:I; showColDivider:I; lineWidth:F; dividerRed:L; dividerGreen:L; dividerBlue:L)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ breakLevel	integer	Break level number
→ columnNum	integer	Number of column
→ showColDivider	integer	Show column divider, if any, in the break
→ lineWidth	real	Width of the horizontal break line
→ dividerRed	longint	Horizontal break line — Red
→ dividerGreen	longint	Horizontal break line — Green
→ dividerBlue	longint	Horizontal break line — Blue

PL_SetBrkColRGBOpt is used to control the printing of column dividers and horizontal lines within the **breakLevel** for each **columnNum** and to print a horizontal line within a column for this break level.

This routine works in the same manner as PL_SetBrkColOpt, except it allows you to specify the colors using standard RGB values.

PL_SetBkHColOpt (areaRef:L; breakLevel:I; columnNum:I; showColDivider:I; lineWidth:F; pattern:S; plpColor:S; 4dColor:I)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ breakLevel	integer	Break level number
→ columnNum	integer	Number of column
→ showColDivider	integer	Show column divider, if any, in the break
→ lineWidth	real	Width of the horizontal break line
→ pattern	string	Pattern of the horizontal break line
→ plpColor	string	Color from PrintList Pro's palette for the horizontal break line
→ 4dColor	integer	Color from 4D's palette for the horizontal break line

PL_SetBkHColOpt is used to control the printing of column dividers and horizontal lines within a break header cell.

This command is identical to PL_SetBrkColOpt, except ***PL_SetBkHColOpt*** will print the horizontal lines at the bottom of the cell instead of at the top.

If **showColDivider** is 1, a column divider will be printed along the right side of the column specified. The line characteristics are identical to the column divider shown in the list (detail area).

PL_SetBkHColOpt may be called to show a horizontal line at the bottom of the break specified in **breakLevel** in the column specified by **columnNum**.

If ***PL_SetBkHColOpt*** is not called for any columns in a given break level, then no column dividers or horizontal break lines will be shown for that break level.

PL_SetBkHColRGBOpt

PrintList Pro has its own palette, with the following colors: white, black, blue, green, yellow, magenta, red, cyan, gray, light gray. Color constants can be used.

showColDivider — 0 or 1:

- 0 — don't show a column divider (default)
- 1 — show the column divider along the right side of the column specified in the **columnNum** parameter whenever a break for the break level specified in **breakLevel** occurs

lineWidth — 0 to 1. This option controls the line width of the horizontal break line. A value of 0.25 pixels should be used for hairlines. A value of 0 means that no line will be printed. Double lines (typical in accounting) are supported in breaks: just use 2.0 as the **lineWidth**: two 0.25 point lines will be printed.

pattern — Name of the pattern (transparency ratio) for the horizontal break line. If a null string is used then no line will be printed. These are the available patterns: white, black, gray, light gray, and dark gray. See the Patterns item in the Compatibility Notes.

plpColor — Name of the color in PrintList Pro's palette. This will be the color for the horizontal break line. If the name is not in PrintList Pro's palette or it is a null string, then 4dColor will be used.

4dColor — 1 to 256. The color at this position in 4D's palette will be used for the horizontal break line.

PL_SetBkHColRGBOpt (areaRef:L; breakLevel:I; columnNum:I; showColDivider:I; lineWidth:F; dividerRed:L; dividerGreen:L; dividerBlue:L)

Parameter	*Type*	*Description*
→ areaRef	longint	Reference of PrintList Pro object on layout
→ breakLevel	integer	Break level number
→ columnNum	integer	Number of column
→ showColDivider	integer	Show column divider, if any, in the break
→ lineWidth	real	Width of the horizontal break line
→ dividerRed	longint	Horizontal break line — Red
→ dividerGreen	longint	Horizontal break line — Green
→ dividerBlue	longint	Horizontal break line — Blue

PL_SetBkHColRGBOpt is used to control the printing of column dividers and horizontal lines within a break header cell.

This routine works in the same manner as PL_SetBkHColOpt, except it allows you to specify the colors using standard RGB values.

PL_ProcessArrays

PL_ProcessArrays (callbackMethodName:S; breakArrays:Y; dataArrays:Y; useDetail:L) -> error:L

Parameter	*Type*	*Description*
→ callbackMethodName	string	Name of the Computed Break callback project method
→ breakArrays	array	Array of pointers to arrays where breaks must occur (one array for each break level)
→ dataArrays	array	Array of pointers to arrays containing the data to be processed in the callback method
→ useDetail	longint	0 = callback method is called only on breaks 1 = callback method is called on breaks and on each row

PL_ProcessArrays is used to set Computed Breaks. No plugin area is needed, this feature is pure computing on previously sorted arrays (e.g. with **MULTI SORT ARRAY**).

callbackMethodName — 4D project method to be called on breaks as defined by **breakArrays** and also on each row according to **useDetail**.

The callback method is called as: ***callbackMethodName*** (**handle**:L; **row**:L; **breakLevel**:L)

- **handle** is to be used as parameter 1 when calling PL_GetBreakValue for the callback
- **row** is the current row number
- **breakLevel** is the current break level, -1 for data row (if **useDetail** = 1)

breakArrays — **ARRAY POINTER** containing pointers to previously sorted arrays where breaks should occur and **callbackMethodName** be called. Local arrays are allowed. First element determines break level 1, second 2, etc.

When **breakArrays** is empty, the only break generated will be 0.

dataArrays — **ARRAY POINTER** containing pointers to arrays that will be passed by **callbackMethodName** to ***PL_GetBreakValue*** in order to retrieve the computed break values. Local arrays are allowed. First element is column 1 for ***PL_GetBreakValue***, second is 2, etc.

When **dataArrays** is empty, no calculations are performed.

useDetail — set to 0 for **callbackMethodName** to be called only with break information, set it to 1 to call the callback method with every data row and with breaks.

PL_ProcessArrays operates on a copy of the arrays, you can freely modify them in the callback.

PL_GetBreakValue

PL_GetBreakValue (handle:L; column:L; calculation:L) -> value:F

Parameter	*Type*	*Description*
→ handle	string	Identification of the current ***PL_ProcessArrays*** call
→ column	array	Index of the column to be processed in the dataArrays array set by ***PL_ProcessArrays***
→ calculation	array	Calculation type

PL_GetBreakValue is called from the callback method set by PL_ProcessArrays to perform usual break level processing **calculations** such as sum, minimum, etc. for the current break level (or individual row) and the specified **column**.

The **calculation** result is returned in **value** by ***PL_GetBreakValue***.

handle is an identification of the current ***PL_ProcessArrays*** call. This is actually the process ID. Make sure not to call ***PL_ProcessArrays*** in the callback!

column is the index from the **dataArrays** pointer array defined by ***PL_ProcessArrays***.

When **column** is out of range, zero is returned.

calculation can be one of the following values:

Calculation	*Value*
Sum	1
Minimum	2
Average	3
Maximum	4
Count	5
Variance	6
Standard deviation	7

callbackMethodName is the only place where you can call ***PL_GetBreakValue***, using the handle provided as the first parameter received by the callback method.

Calculations are performed "on the fly" after fetching each data row. So when you call ***PL_GetBreakValue*** on a data row (not on a break), you will get the current values for that row.

For example, using empty **breakArrays** and **useDetail**=1, calling ***PL_GetBreakValue*** to get the SUM (1), the command will return the sum of rows 1 through current row.

See also Using Computed Breaks and Example 5 — Computed Breaks.

Examples

The examples in this section are designed to provide an overview of the use of PrintList Pro and the basic commands.

You may also wish to examine the PrintList Pro demo, for more examples on the various PrintList Pro capabilities.

Example 1 — One record current selection

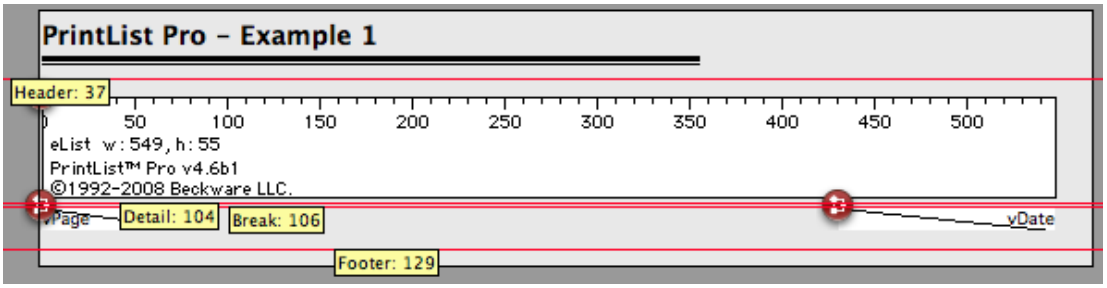
Print a list of information (First name, Last name, Salary, City, State, Zip, Country) contained in a series of seven arrays. Show column headers and print dividing lines between the columns. Do not print dividing lines between the rows.

PRINT SELECTION is used to print PrintList Pro plug-in objects. It is important therefore, that you carefully control the current selection, since a PrintList Pro plug-in object will print once for each record in the current selection.

This example illustrates a situation where the PrintList Pro object is to be printed once, so we can use the **PRINT RECORD** command regardless of the current selection.

First we need to create the layout and draw the PrintList Pro plug-in object. We'll name the object eList.

Our layout now looks something like this:



The project method which controls the printing is:

```
ALL RECORDS([Layouts])
OUTPUT FORM([Layouts];"Example 1")
PRINT RECORD([Layouts])
```

We'll use the On Printing Detail event to configure our PrintList Pro area.

Example 1 — One record current selection

Here is the PrintList Pro area's object method:

```
If (Form event=On Printing Detail)
   ALL RECORDS([People])
    // Create the arrays from the data
   SELECTION TO ARRAY([People]First Name;aFname;[People]Last Name;aLname;[People]Salary;
      aSalary;[People]City;aCity;[People]State;aState;[People]Zip;aZip;[People]Country;aCountry)
   $plErr:=PL_SetArraysNam(eList;1;7;"aFname";"aLname";"aSalary";"aCity";"aState";"aZip";
            "aCountry") // set the arrays
   If ($plErr=0)
      PL_SetHdrOpts(eList;2;0) // print headers on all pages
      PL_SetHeaders(eList;1;7;"First Name";"Last Name";"Salary";"City";"State";"Zip";"Country")

       // apply to all headers: Lucida Grande 10 point bold
      PL_SetHdrStyle(eList;0;"Lucida Grande";10;1)
      PL_SetStyle(eList;0;"Lucida Grande";9;0) // apply to all columns: Lucida Grande 9 point plain

       // print only column dividers: solid gray hairlines
      PL_SetDividers(eList;25;"Black";"Gray";0;0;"";"";0)

       // sort column 2 (Last name) in descending order
      PL_SetSort(eList;-2)
   End if
End if
```

The printed layout will appear as shown below:

PrintList Pro – Example 1

First Name	Last Name	Salary	City	State	Zip	Country
Todd	Zipnick	52,230.08	Phoenix	AZ	60090	USA
Bob	Yuderman	22,295.00	Paris		94538	France
Jeffrey	Young	49,687.96	Los Angeles	CA	94404	USA
Del	Yocam	63,118.86	San Jose	CA	95014	USA
Curtis	Wright	84,651.42	Rome		95113	Italy
William	Woodward	26,602.10	Bangkok		94107	Thailand
Ron	Wong	24,500.00	San Jose	CA	95014	USA
Ron	Wolf	25,432.96	Minneapolis	MN	95190	USA
Amy	Wohl	62,771.94	London		19004	England
Robert	Wiggins	75,296.34	Jersulaem		94306	Israel
Clair	Whitmer	27,975.08	Tapei	Ta	94105	ROC
Joel	Weiss	86,803.50	Redmond	WA	94544	USA
Peter	Watkins	92,377.74	Portland	OR	95014	USA
John	Warnock	95,805.78	Milan		94039-7900	Italy
George	Voltz	60,843.30	San Jose	CA	02144	USA
Steve	Vollum	63,119.84	Munich		97005	Germany
Larry	Tesler	39,933.04	Santa Fe	NM	95014	USA
Michael	Tchong	24,963.54	Cupertino	CA	94105	USA
Jeffrey	Tarter	65,115.12	Denver	CO	02138	USA
Harry	Sweere	60,111.24	Boston	MA	55121	USA
Karen	Sullivan	61,707.66	Portland	OR	10018	USA
Michael	Stern	28,716.94	Brooklyn	NY	19131	USA
Mitch	Stein	26,078.78	Portland	OR	94039-7900	USA
Sherwin	Steffin	70,962.78	Cupertino	CA	91302	USA
Martha	Steffen	50,354.36	Tapei	Ta	95014	ROC
Steven	Stansel	24,130.54	San Jose	CA	01867	USA
David	Smith	23,551.36	Los Angeles	CA	92670	USA
Doug	Sleeter	65,797.20	Santa Fe	NM	95014	USA
Mike	Slade	47,057.64	Boston	MA	98072	USA
Pradeep	Singh	49,758.52	Munich		98072	Germany
Rich	Shapero	61,049.10	Tapei	Ta	94501	ROC
Richard	Shaffer	26,659.92	Quincy	MA	10016	USA
Dan	Shafer	21,181.72	Ft. Worth	TX	94062	USA
Jonathan	Seybold	22,741.88	Dallas	TX	90265	USA

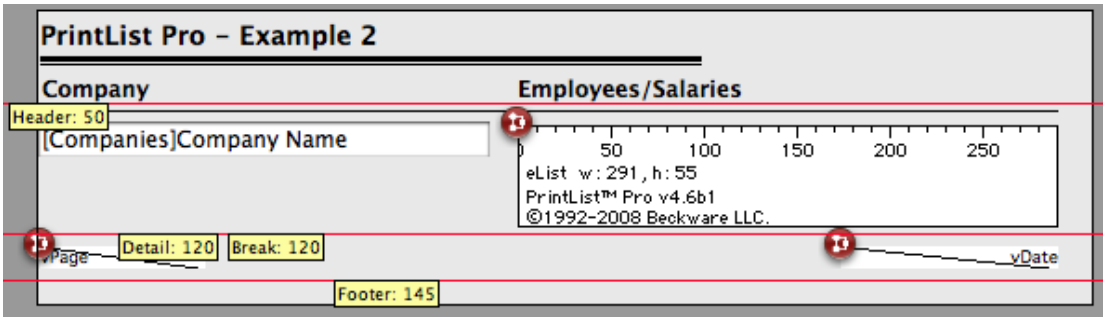
Example 2 — Multiple record current selection

Print a list of company names, showing all the people who work for each company. This example will illustrate the use of PrintList Pro with multiple records in the current selection.

For purposes of illustration, the company names will be printed directly from the [Companies] table, and the [People] information will be printed from a series of arrays using PrintList Pro.

Create the layout and draw the PrintList Pro plug-in object. This process is substantially the same as that explained in the first example, with one exception — we are going to include a field directly on the layout which will print information alongside the PrintList Pro object.

Our layout is illustrated below:



The only difference between this example and Example 1 is that we are printing out multiple records.

Since the PrintList Pro commands are executed in the On Printing Detail event of the **PRINT SELECTION** command we can change the People arrays "on the fly".

The [Companies] file is in a One-to-Many relationship with the [People] file, and the links are automatic.

As each [Companies] record is printed a new selection of [People] records is created.

This [People] selection is stored in arrays and printed.

The controlling project method is:

```
ALL RECORDS([Companies])
OUTPUT FORM([Companies];"Example 2")
PRINT SELECTION([Companies])
```

Example 2 — Multiple record current selection

The PrintList Pro area's object method is:

```
If (Form event=On Printing Detail)
   // Create the arrays . The current selection of [People] changes with each new record
   SELECTION TO ARRAY([People]First Name;aFname;[People]Last Name;aLname;[People]Salary;
      aSalary)
   $plErr:=PL_SetArraysNam(eList;1;3;"aFname";"aLname";"aSalary") // set the arrays
   If ($plErr=0)
      PL_SetHdrOpts(eList;1;0) // print headers at the top of the area only
      PL_SetHeaders(eList;1;3;"First Name";"Last Name";"Salary") // set headers
      // apply to all headers: Lucida Grande 10 point bold
      PL_SetHdrStyle(eList;0;"Lucida Grande";10;1)
      PL_SetStyle(eList;0;"Lucida Grande";9;0) // apply to all columns: Lucida Grande 9 point plain
      // format column 3, right justified header and column
      PL_SetFormat(eList;3;"$###,###,###.00";3;3)
      // solid black hairline frame/hdr line
      PL_SetFrame(eList;0.25;"Black";"Black";0;0.25;"Black";"Black";0)
   End if
End if
```

A portion of our resulting printout appears below:

PrintList Pro – Example 2

Company	Employees/Salaries		
Addison-Wesley Publishing Co.,	**First Name**	**Last Name**	**Salary**
	Mike	Erickson	$1,000.00
	Steven	Stansel	$24,130.54
Apple Computer, Inc.	**First Name**	**Last Name**	**Salary**
	Barbara	Anderson	$68,484.36
	Samir	Arora	$63,847.98
	Randy	Battat	$26,898.06
	Bill	Coldrick	$42,369.32
	Debi	Coleman	$71,092.14
	Moira	Cullen	$69,613.32
	David	Eyes	$28,964.88
	Jonathan	Fader	$30,048.76
	Jim	Floyd	$25,055.66
	Linda	Glish	$63,990.08
	Russ	Havard	$20,953.38
	Mike	Homer	$46,056.08
	Barbara	Krause	$41,832.28
	Tim	Kreps	$80,500.14
	Jon	Magill	$59,917.20
	John	Sculley	$25,392.78
	Doug	Sleeter	$65,797.20
	Martha	Steffen	$50,354.36
	Larry	Tesler	$39,933.04
	Peter	Watkins	$92,377.74
	Ron	Wong	$24,500.00
National Apple Professional In	**First Name**	**Last Name**	**Salary**
	Mike	Bailey	$83,410.74
CompuServe	**First Name**	**Last Name**	**Salary**
	Sharon	Jones	$90,019.86
Affinity Microsystems, Ltd.	**First Name**	**Last Name**	**Salary**
	Rick	Barron	$59,908.38

Example 3 — Adding a total line to the list

Print the same list of company names and people as Example 2 and add a total line after the end of each list of people. The total line will contain a sum of the salaries for all the people working for that company.

A total line requires us to use PrintList Pro's Break Level commands.

While most break levels require the list to be sorted, a total line is the exception. The total line is is configured by passing 0 for the break level parameter.

The object method for the PrintList Pro area in Example 2 has been modified to include the Break Level calls needed as shown below:

```
If (Form event=On Printing Detail)
    // Create the arrays - The current selection of [People] changes with each new record
   SELECTION TO ARRAY([People]First Name;aFname;[People]Last Name;aLname;[People]Salary;
      aSalary)
   $plErr:=PL_SetArraysNam(eList;1;3;"aFname";"aLname";"aSalary") // set the arrays
   If ($plErr=0)
      PL_SetHdrOpts(eList;1;0) // print headers at the top of the area only
      PL_SetHeaders(eList;1;3;"First Name";"Last Name";"Salary") // set headers
       // apply to all headers: Lucida Grande 10 point bold
      PL_SetHdrStyle(eList;0;"Lucida Grande";10;1)
      PL_SetStyle(eList;0;"Lucida Grande";9;0) // apply to all columns: Lucida Grande 9 point plain
       // format column 3, right justified header and column
      PL_SetFormat(eList;3;"$###,###,###.00";3;3)  // solid black hairline frame/hdr line
      PL_SetFrame(eList;0.25;"Black";"Black";0;0.25;"Black";"Black";0)
      PL_SetWidths(eList;1;3;80;80;100) // set the column widths
       // Configure the total line
      PL_SetBrkText(eList;0;3;"\Sum";0;0) // calculate the sum in the total line
      PL_SetBrkHeight(eList;0;1;4) // add some padding to the total line
      PL_SetBrkColOpt(eList;0;3;0;0.25;"Black";"Black";0) // draw a line above the total
   End if
End if
```

Example 3 — Adding a total line to the list

The total line now appears in the list as is shown below:

PrintList Pro - Example 3

Company	Employees/Salaries		
Addison-Wesley Publishing Co.,	**First Name**	**Last Name**	**Salary**
	Mike	Erickson	$1,000.00
	Steven	Stansel	$24,130.54
			$25,130.54
Apple Computer, Inc.	**First Name**	**Last Name**	**Salary**
	Barbara	Anderson	$68,484.36
	Samir	Arora	$63,847.98
	Randy	Battat	$26,898.06
	Bill	Coldrick	$42,369.32
	Debi	Coleman	$71,092.14
	Moira	Cullen	$69,613.32
	David	Eyes	$28,964.88
	Jonathan	Fader	$30,048.76
	Jim	Floyd	$25,055.66
	Linda	Glish	$63,990.08
	Russ	Havard	$20,953.38
	Mike	Homer	$46,056.08
	Barbara	Krause	$41,832.28
	Tim	Kreps	$80,500.14
	Jon	Magill	$59,917.20
	John	Sculley	$25,392.78
	Doug	Sleeter	$65,797.20
	Martha	Steffen	$50,354.36
	Larry	Tesler	$39,933.04
	Peter	Watkins	$92,377.74
	Ron	Wong	$24,500.00
			$1,037,978.76
National Apple Professional In	**First Name**	**Last Name**	**Salary**
	Mike	Bailey	$83,410.74
			$83,410.74
CompuServe	**First Name**	**Last Name**	**Salary**
	Sharon	Jones	$90,019.86
			$90,019.86
Affinity Microsystems, Ltd.	**First Name**	**Last Name**	**Salary**
	Rick	Barron	$59,908.38
			$59,908.38
San Jose Mercury News	**First Name**	**Last Name**	**Salary**
	Jim	Bartimo	$21,418.88
	Rory	O'Connor	$63,409.92
	Ron	Wolf	$25,432.96
			$110,261.76
Think Educational Software, In	**First Name**	**Last Name**	**Salary**
	Gregory	Berkin	$62,239.80
			$62,239.80

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Example 4 — Break Level Processing

Print the same list of information shown in Example 1 and add some break level information for all the people in the same city. The break will show a sum, minimum, average, maximum and standard deviation of the people's salaries in each city.

Labels for each of the calculations will be printed in the adjacent column to salary. The break will also show the number of people in the city and the city name.

A custom calculation is included along with the other calculations to calculate an end of year bonus based on 5% of the average salary.

The list is sorted by country, state, city and last name. This allows the suppression of repeated values for each of these columns. In order to set break information for the city, we must configure break level 3 because the city array is 3rd in the sort order.

Each of the calculations mentioned will be printed on a separate line, so the height of the break is set to 6 lines. Carriage returns are inserted between the labels and calculations so that each will start on a new line.

The code for the callback function follows the object method to the PrintList Pro object. In addition, two header lines are shown to demonstrate the ability for multiple lines in a header.

The object method for the PrintList Pro plug-in area in Example 1 has been modified to include the Break Level calls needed as shown below:

```
If (Form event=On Printing Detail)
   // Create the arrays from the data
   ALL RECORDS([People])
   SELECTION TO ARRAY([People]First Name;aFname;[People]Last Name;aLname;[People]Salary;
      aSalary;[People]City;aCity;[People]State;aState;[People]Country;aCountry)
   $plErr:=PL_SetArraysNam(eList;1;6;"aFname";"aLname";"aSalary";"aCity";"aState";
      "aCountry") // set the arrays

   If ($plErr=0)
      PL_SetHdrOpts(eList;2;0) // print headers on all pages
      PL_SetHeight(eList;2;4;1;0) // 2 hdr lines, 4 hdr pad, 1 row line, 2 row pad
      PL_SetHeaders(eList;1;6;"First Name";"Last Name";"Salary";"City";"State";"Country")
      PL_SetHdrStyle(eList;0;"Lucida Grande";10;1) // all headers: Lucida Grande 10 point bold
      PL_SetStyle(eList;0;"Lucida Grande";9;0) // all columns: Lucida Grande 9 point plain
      PL_SetFormat(eList;3;"$###,###,###.00";3;3) // format column 3, right justified header and
         column
      PL_SetFrame(eList;0.25;"Black";"Black";0;0.25;"Black";"Black";0) // print solid black hairline
         frame
      PL_SetWidths(eList;1;6;76;80;89;79;80;48) // set the column widths
      PL_SetBackClr(eList;"Light Gray";0;"White";0)
      // sort by Country (descending), State, City, and Last Name (descending)
      PL_SetSort(eList;-6;5;4;-2)
```

Example 4 — Break Level Processing

```
        // Break level Configuration
        PL_SetRepeatVal(eList;0;1) // suppress repeating values in all columns
        PL_SetBrkFunc(eList;"Break Function") // set the callback function
        PL_SetBrkRowDiv(eList;0.25;"Black";"Black";0) // print a Break/Row divider
        // Configure break level 3, city
        PL_SetBrkHeight(eList;3;6;4) // print 6 lines for break level 3
        // Print the calculation labels in the column to the left of the salaries
        PL_SetBrkText(eList;3;2;"Sum"+Char(13)+"Average"+Char(13)+"Minimum"+Char(13)
           +"Maximum"+Char(13)+"Standard Dev"+Char(13)+"Bonus";0;3)
        PL_SetBrkStyle(eList;3;2;"Lucida Grande";9;1) // make the labels bold
        // Print the Sum, Minimum, Average, Maximum, Standard Deviation and Bonus for salaries
        PL_SetBrkText(eList;3;3;"\\Sum"+Char(13)+"\\Minimum"+Char(13)+"\\Average"+Char(13)
           +"\\Maximum"+Char(13)+"\\Dev"+Char(13)+"\\Function";0;0)
        // Show the number of people in this city
        PL_SetBrkText(eList;3;5;Char(13)+"\Count people in \breakValue";1;2)
        PL_SetBrkStyle(eList;3;5;"Lucida Grande";10;3) // make the city count info 10 points bold
        PL_SetBrkColOpt(eList;3;3;0;0.25;"Black";"Black";0) // print a subtotal line in the salary column
    End if
End if
```

The Break Function callback method for the "Bonus" custom calculation is as follows:

```
C_INTEGER ($1;$2) // break level, column
C_STRING (82;$3) // column format
C_LONGINT($4;$5) // start row, end row
C_TEXT($0) // custom calculation result to print
C_LONGINT($i;$count)
C_REAL($result;$average)
// Calculate the average
For ($i;$4;$5)
   $result:=$result+aSalary{$i}
End for
$count:=$5-$4+1
$average:=$result/$count
$result:=Int($average*0,05) // 5% rounded
$0:=String($result;$3)
```

Example 4 — Break Level Processing

Here is a sample of the list containing the breaks:

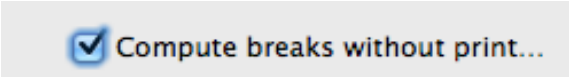
PrintList™ Pro Demo: Break-Level Processing.

First Name	Last Name	Salary	City	State	Country
Bill	Goodhew	$23 275,98	Podunk	AR	USA
Stan	Getz	$60 956,00	Podunk	AR	USA
Yogen	Dalal	$41 491,24	Podunk	AR	USA
Bill	Coldrick	$42 369,32	Podunk	AR	USA
	Sum	$168 092,54			
	Minimum	$23 275,98		**4 people in Podunk**	
	Average	$42 023,13			
	Maximum	$60 956,00			
	Standard Dev	$13 325,83			
	Bonus	$2 101,00			
Todd	Zipnick	$52 230,08	Phoenix	AZ	USA
Michelle	Preston	$31 782,38	Phoenix	AZ	USA
John	Markoff	$20 416,34	Phoenix	AZ	USA
	Sum	$104 428,80			
	Minimum	$20 416,34		**3 people in Phoenix**	
	Average	$34 809,60			
	Maximum	$52 230,08			
	Standard Dev	$13 163,11			
	Bonus	$1 740,00			
Michael	Tchong	$24 963,54	Cupertino	CA	USA
Sherwin	Steffin	$70 962,78	Cupertino	CA	USA
Jonathan	Fader	$30 048,76	Cupertino	CA	USA
Mary	Evslin	$46 685,24	Cupertino	CA	USA
Moira	Cullen	$69 613,32	Cupertino	CA	USA
Ed	Cheffetz	$53 588,36	Cupertino	CA	USA
	Sum	$295 862,00			
	Minimum	$24 963,54		**6 people in Cupertino**	
	Average	$49 310,33			
	Maximum	$70 962,78			
	Standard Dev	$17 654,11			
	Bonus	$2 465,00			
Jeffrey	Young	$49 687,96	Los Angeles	CA	USA
David	Smith	$23 551,36	Los Angeles	CA	USA
Scott	Schwarts	$24 334,38	Los Angeles	CA	USA
Stephen	Saltzman	$62 937,56	Los Angeles	CA	USA
Bill	Gates	$26 287,52	Los Angeles	CA	USA
Bruce	Davis	$57 186,92	Los Angeles	CA	USA
Raines	Cohen	$29 784,16	Los Angeles	CA	USA
Paul	Brainerd	$59 952,48	Los Angeles	CA	USA
Lofty	Becker	$85 627,50	Los Angeles	CA	USA
	Sum	$419 349,84			
	Minimum	$23 551,36		**9 people in Los Angeles**	
	Average	$46 594,42			
	Maximum	$85 627,50			
	Standard Dev	$20 581,37			
	Bonus	$2 329,00			
Christopher	Robert	$51 063,88	San Francisco	CA	USA
Regis	McKenna	$57 916,04	San Francisco	CA	USA
Bob	Leff	$87 341,52	San Francisco	CA	USA
Mike	Kramer	$21 337,54	San Francisco	CA	USA
Ed	Bogas	$51 108,96	San Francisco	CA	USA

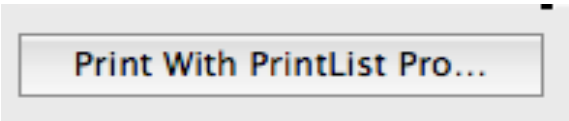
Example 5 — Computed Breaks

Computed breaks are a powerful array utility module, which does not require printing.

The demonstration database includes an example under PrintList Pro > Configuration options... Check the "Compute breaks without print" box:



then click the "Print With PrintList Pro" button:



We will perform a similar action, using the same arrays as in Example 4, then call PL_ProcessArrays and PL_GetBreakValue to retrieve the results and build a break summary.

We will create a text variable containing all break results without printing anything, then copy it into the pasteboard. We could also display the text variable like in the demonstration database, or use it otherwise.

```
C_TEXT(vBrkComputeResult)
ARRAY TEXT(TbreakText_R;0)
C_LONGINT($i)

 // Create the arrays from the data
ALL RECORDS([People])
SELECTION TO ARRAY([People]First Name;aFname;[People]Last Name;aLname;[People]Salary;
   aSalary;[People]City;aCity;[People]State;aState;[People]Country;aCountry)

 // Sort by Country (descending), State, City, and Last Name (descending)
MULTI SORT ARRAY(aCountry;<;aState;>;aCity;>;aLname;<;aFname;aSalary)

 // Declare the "data" array pointing on the actual arrays on which to perform calculations in our callback
 // (we include all arrays in case we'll need them someday, even though we will only use aSalary here)
ARRAY POINTER($dataArrays;0)
APPEND TO ARRAY($dataArrays;->aCountry)
APPEND TO ARRAY($dataArrays;->aState)
APPEND TO ARRAY($dataArrays;->aCity)
APPEND TO ARRAY($dataArrays;->aLname)
APPEND TO ARRAY($dataArrays;->aFname)
APPEND TO ARRAY($dataArrays;->aSalary)

 // Declare the "break" array pointing on the arrays where to catch breaks in our callback
 // according to our MULTI SORT ARRAY above (sorted arrays)
ARRAY POINTER($breakArrays;0)
APPEND TO ARRAY($breakArrays;->aCountry)
APPEND TO ARRAY($breakArrays;->aState)
APPEND TO ARRAY($breakArrays;->aCity)
APPEND TO ARRAY($breakArrays;->aLname)
```

Example 5 — Computed Breaks

```
// Now we process the arrays using the "PlpComputeBreak" project method for computing
If (PL_ProcessArrays ("PlpComputeBreak";$breakArrays;$dataArrays;0)=0)
   // 4th parameter is 0 for each break or 1 for each row

   // Now TbreakText_R has been populated by PlpComputeBreak: concatenate breaks into a text variable
   vBrkComputeResult:=""
   For ($i;1;Size of array(TbreakText_R))
      vBrkComputeResult:=vBrkComputeResult+TbreakText_R{$i}+Char(Carriage return)
   End for
   SET TEXT TO PASTEBOARD(vBrkComputeResult) // or do something else with vBrkComputeResult
End if
```

Here is our ***PlpComputeBreak*** callback method.

```
C_LONGINT($1;$2;$3) // handle, row, break level ($breakArrays)
C_LONGINT($dataArray) //position of the array to feed computed break in $dataArrays
   from the calling method (third parameter to PL_ProcessArrays
C_TEXT($format;$breakText)

If ($3>=0) // is it a break?
   $dataArray:=6 // aSalary
   $format:="$###,###,###.00"

   Case of
      : ($3=1) // break on aCountry
      : ($3=2) // break on aState
      : ($3=3) // break on aCity
         // $breakText:="Hello, I am the break at level "+String($3)+" after row "+String($2)
            +(Char(Carriage return)*2) // we could do this to use $2

// Concatenate the text for the current break
         $breakText:=""
         $breakText:=$breakText+"There are "+String(PL_GetBreakValue ($1;$dataArray;5))
            +" people in "+aCity{$2-1}+(Char(Carriage return)*2)
         $breakText:=$breakText+"Sum: "+String(PL_GetBreakValue ($1;$dataArray;1);$format)
            +Char(Carriage return)
         $breakText:=$breakText+"Minimum: "+String(PL_GetBreakValue ($1;$dataArray;2);
            $format)+Char(Carriage return)
         $breakText:=$breakText+"Average: "+String(PL_GetBreakValue ($1;$dataArray;3);
            $format)+Char(Carriage return)
         $breakText:=$breakText+"Maximum: "+String(PL_GetBreakValue ($1;$dataArray;4);
            $format)+Char(Carriage return)
         $breakText:=$breakText+"Standard Dev: "+String(PL_GetBreakValue ($1;$dataArray;7);
            $format)+Char(Carriage return)

// we perform the 5% calculation right here:
         $breakText:=$breakText+"Bonus: "+String(Round(PL_GetBreakValue ($1;$dataArray;3)
            *0,05;0);$format)+Char(Carriage return)
         $breakText:=$breakText+"---------------"+Char(Carriage return)
         APPEND TO ARRAY(TbreakText_R;$breakText)

      : ($3=4) // break on last name
   End case
Else // this is a row because $3 < 0
 // do something
End if
```

Example 5 — Computed Breaks

Here is the resulting text:

```
There are 4 people in Podunk

Sum: $168 092,54
Minimum: $23 275,98
Average: $42 023,13
Maximum: $60 956,00
Standard Dev: $13 325,83
Bonus: $2 101,00
---------------

There are 3 people in Phoenix

Sum: $104 428,80
Minimum: $20 416,34
Average: $34 809,60
Maximum: $52 230,08
Standard Dev: $13 163,11
Bonus: $1 740,00
---------------

There are 6 people in Cupertino

Sum: $295 862,00
Minimum: $24 963,54
Average: $49 310,33
Maximum: $70 962,78
Standard Dev: $17 654,11
Bonus: $2 466,00
---------------

(etc.)
```

PrintList Pro Constant List

PLP Colors		
PL White	S	white
PL Black	S	black
PL Magenta	S	magenta
PL Red	S	red
PL Cyan	S	cyan
PL Green	S	green
PL Blue	S	blue
PL Yellow	S	yellow
PL Gray	S	gray
PL Light gray	S	light gray
PL Use 4D palette color	S	
PLP Patterns		
PL White pattern	S	white
PL Black pattern	S	black
PL Gray pattern	S	gray
PL Light gray pattern	S	light gray
PL Dark gray pattern	S	dark gray
PLP Command Results		
PL Registration Failed	L	1
PL Registration Passed	L	0
PL SetArrays Passed	L	0
PL Not an array	L	1
PL Wrong type of array	L	2
PL Wrong number of rows	L	3
PL Maximum number of arrays exc	L	4
PL Not enough memory	L	5
PL SetFile Passed	L	0
PL Not a file	L	6
PL Wrong 4D version	L	10
PL Arrays have been set	L	11
PL Fields have been set	L	12
PL SetFields Passed	L	0
PL Not a field	L	7
PL Wrong field type	L	8
PL Maximum fields exceeded	L	9
PL Save Data Passed	L	0
PL Save Data Failed	L	1
PL Restore Data Passed	L	0
PL Restore Data Failed	L	1
PLP Justification		
PL Just Default	L	0
PL Just Left	L	1
PL Just Center	L	2
PL Just Right	L	3
PLP Font Style		
PL Plain	L	0
PL Bold	L	1
PL Italic	L	2
PL Underline	L	4
PL Outline	L	8
PL Shadow	L	16
PL Condensed	L	32
PL Extended	L	64

PLP Break Levels		
PL Break Level 1	L	1
PL Break Level 2	L	2
PL Break Level 3	L	3
PL Break Level 4	L	4
PL Break Level 5	L	5
PL Break Level 6	L	6
PL Break Level 7	L	7
PL Break Level 8	L	8
PL Break Level 9	L	9
PL Sum	S	\Sum
PL Average	S	\Average
PL Minimum	S	\Minimum
PL Maximum	S	\Maximum
PL Count	S	\Count
PL Variance	S	\Var
PL Deviation	S	\Dev
PL Break Value Insertion	S	\BreakValue
PL Custom Calculation	S	\Function

PLP Break Values		
PL Break Value Sum	L	1
PL Break Value Minimum	L	2
PL Break Value Average	L	3
PL Break Value Maximum	L	4
PL Break Value Count	L	5
PL Break Value Variance	L	6
PL Break Value Deviation	L	7

PLP Options		
PL No Headers	L	0
PL First Page Header	L	1
PL Print All Headers	L	2
PL Suppress Pixel Width	L	0
PL Print Pixel Width	L	1
PL Print Array	L	0
PL Hide Array	L	1
PL Print All Records	L	-1
PL Print Page Breaks	L	1
PL Suppress Page Breaks	L	0
PL Print Last Page Break	L	1
PL Suppress Last Page Break	L	0
PL Print Repeated Values	L	0
PL Suppress Repeated Values	L	1
PL Print Column Divider	L	0
PL Suppress Column Divider	L	1
PL Suppress Detail Area	L	1

PrintList Pro Text Style Tags

If the **attributed** option has been set in PL_SetFormat, special tags can be used in any text contained in a PrintList Pro area to print styled characters.

These tags work just like HTML tags: <tag>styled text</tag>.

Style	Tag
Bold	<b>
Italic	<i>
Underline	<u> or <ins>
Strike-through	<del>
Set font size to # points	<s #>
Increase font size by # quarters (1/4) of current size	<s +#>
Decrease font size by # quarters (1/4) of current size	<s -#>
Set font by name	<f "font name"> (needs to be quoted if the name contains more than one word)
Set color (any format can be used, e.g. <c 0xFFFF0000> <c 1.0,0,0> <c P123> <c dark orange>)	<c color name>

4D v12 (and above) internal format for styled text is stored as <SPAN STYLE="style attributes"> where the style attributes used by PrintList Pro are:

- font-family
- font-size
- font-weight (bold/normal)
- font-style (italic/normal)
- text-decoration (underline/ line-through/none)
- color (#RRGGBB).

It is also possible to set the format as attributed, and specify the style attributes using the ***PL_SetFormat*** command.

Example for an integer column:

```
C_TEXT($format)
$format:="<c blue>+#####</c>;<i><c red>-#####</c></i>;<s+1><c green><b>ZERO</b></c></s>"
PL_SetFormat ($area;1;$column;0;0;1;1;1;0)
 // right-aligned (it is a number; default of zero will use 2), auto-sized height (because ZERO is bigger),
    attributed, with "compatible" line spacing and default vertical alignment
```

With the above settings:

- Positive numbers will be printed in blue roman characters with a plus sign.
- Negative numbers will be printed in red italic characters with a minus sign.
- Zeros will be printed in green bold, font size increased by 25%, with the text "ZERO".

Here is the result:

Note that if the number format is too “small” to hold the number, 4D (and PrintList Pro) will display it as “<<<<<<<<<<<<<<<<<<”, which will interfere with the opening tag character “<” if the column is attributed (multi-styled).

In the example above (using "## ###" as a number format), this will be the case for all numbers exceeding 99,999.

Make sure that the format used will not cause the number to overflow, lest unexpected results might ensue.

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